United States Department of the Interior

FISH AND WILDLIFE SERVICE
9325 South Alda Road
Wood River, Nebraska 68883

In Reply Refer to:
R Project Biological Opinion

DATE: February 9, 2026

TO: Marjorie Nelson, Assistant Regional Director, Ecological Services, Mountain-Prairie Region

FROM: Mark Porath, Field Supervisor, Nebraska Field Office

MARK PORATH Digitally signed by MARK PORATH
Date: 2026.02.09 16:36:04 -06'00'

SUBJECT: Transmittal of Final Intra-Service Biological and Conference Opinion on Issuance of an Incidental Take Permit for American burying beetle for the R-Project in Nebraska
Ecosphere Number: 2024-0060578

The Nebraska Public Power District (NPPD) has applied for an incidental take permit under section 10(a)(1)(B) of the Endangered Species Act for the federally listed threatened American burying beetle (*Nicrophorus americanus*). Accordingly, this memo transmits the signed Intra-Service Biological Opinion on the U.S. Fish and Wildlife Service's (Service) issuance of an incidental take permit for the American burying beetle (ABB) for the R-Project in Nebraska.

The R-Project involves the construction of a 226-mile long 345 KV transmission line in Nebraska. NPPD has submitted a revised R-Project Habitat Conservation Plan (hereafter referred to as the HCP) as part of their application for an incidental take permit. The Service has worked closely with NPPD and its consultants to finalize all the associated documents in accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA, 16 U.S.C. §1531 *et seq*.), and National Environmental Policy Act (NEPA, 42 U.S.C. §4321 *et seq*.).

Throughout the HCP development process, NPPD and the Service examined potential impacts to all federally listed species in the project area. The standard for determining whether activities are likely to result in incidental take is whether take is "reasonably certain" to occur in considering the effects of the proposed action. The intra-Service biological and conference

opinion under section 7 of the ESA analyzes effects to the ABB, the federally endangered whooping crane (*Grus americana*), and the federally proposed threatened monarch butterfly (*Danaus plexippus*) and western regal fritillary (*Argynnis idalia occidentalis*). Although NPPD's permit application requests incidental take of only the ABB, the proposed action of permit issuance is likely to adversely affect the whooping crane, monarch butterfly, and western regal fritillary. For whooping crane, the Service determined that incidental take was not reasonably certain to occur and the proposed action is not likely to jeopardize the continued existence of the species. The Service also determined the proposed action is not likely to jeopardize the continued existence of the monarch butterfly and western regal fritillary.

Additionally, the Service determined that the issuance of an incidental take permit to NPPD may affect, but is not likely to adversely affect the endangered northern long-eared bat (*Myotis septentrionalis*), blowout penstemon (*Penstemon haydenii*), and the federally threatened piping plover (*Charadrius melodus*), rufa red knot (*Calidris canutus rufa*), and western prairie fringed orchid (*Platanthera praeclara*). We determined that the proposed action will have no effect on the federally endangered Topeka shiner (*Notropis topeka*). The Service also determined that the project may affect but is not likely to adversely affect/not likely to jeopardize the continued existence of the federally proposed endangered tricolored bat (*Perimyotis sublflavus*) and proposed endangered Suckley's cuckoo bumble bee (*Bombus occidentalis).* A detailed discussion of species information and conservation measures are included within the HCP (pages 81-116, NPPD 2025) and the Service's determination is described in the table below (Table 1).

We have also determined that authorization from the Service for the incidental take of bald or golden eagles pursuant to the Bald and Golden Eagle Protection Act (BGEPA) is not required because such take is not anticipated given the HCP's avoidance and minimization measures, and the Migratory Bird Conservation Plan (MBCP; Table 2).

Table 1. ESA Section 7 Determinations

Species	ESA Section 7 Determination	Rationale	Conservation Measures
Piping plover	Not Likely to Adversely Affect	No nesting habitat has been documented in the action area. Minor, temporary disturbance to migratory individuals at North Platte River and South Platte River crossings during construction and maintenance activities is possible, but unlikely; likelihood of impacts	• Avoidance of potential piping plover nesting habitat • Avoidance/spanning of wetland habitat • Wetland habitat will be crossed using specialized equipment, temporary matting, or other BMPs. • Wetland restoration and

Species	ESA Section 7 Determination	Rationale	Conservation Measures
		due to collision with a power line is minimized to a level that is discountable by adherence with NPPD and APLIC line marking standards and implementation of additional conservation measures. Effects from related renewable energy are not reasonably certain to occur based on lack of specific wind turbines or solar infrastructure footprints.	monitoring upon project completion • Installation of bird flight diverters • Implementation of Worker Educational Awareness Program regarding federally protected species and their habitats • Implementation of the MBCP
Rufa red knot	Not Likely to Adversely Affect	This species does not nest in Nebraska. Minor, temporary disturbance to migratory individuals during construction and maintenance activities is possible, but unlikely; likelihood of impacts due to collision with a power line is minimized to a level that is discountable by adherence with NPPD and APLIC line marking standards and implementation of additional conservation measures. Effects from related renewable energy are not reasonably certain to occur based on lack of specific wind turbines or solar infrastructure footprints.	• Avoidance/spanning of wetland habitat • Wetland habitat will be crossed using specialized equipment, temporary matting, or other BMPs. • Wetland restoration and monitoring upon project completion • Installation of bird flight diverters • Implementation of Worker Educational Awareness Program regarding federally protected species and their habitats • Implementation of the MBCP
Northern long-eared bat	Not Likely to Adversely Affect	There are no documented occurrences of this species, or hibernacula of the species, in the action area, likely due to the lack of contiguous suitable forested habitat. Minor temporary disturbance during construction and maintenance	• No tree clearing activities will occur during the summer occupancy period (April 1 – September 30) • Routine operation and maintenance activities will be scheduled during the ABB inactive season, which also

Species	ESA Section 7 Determination	Rationale	Conservation Measures
		activities is possible, but the likelihood of impacts is discountable given the low habitat acreage and avoidance of activities during the species' summer occupancy period. Effects from related renewable energy are not reasonably certain to occur based on lack of specific wind turbines or solar infrastructure footprints.	coincides with bat winter hibernation • Potential roost trees would not be removed by routine operation and maintenance activities during the summer occupancy period (April 1 – September 30) • Implementation of Worker Educational Awareness Program regarding federally protected species and their habitats
Topeka shiner	No Effect	The proposed action will have no effect on Topeka shiner because suitable habitat for this species will not be impacted by the Covered Activities. Effects from related renewable energy are not reasonably certain to occur based on lack of specific wind turbines or solar infrastructure footprints.	• BMPs as described in the Project's SWPP to control erosion and sediment runoff from construction will benefit streams
Blowout penstemon	Not Likely to Adversely Affect	Pre-construction surveys will be conducted to identify potentially suitable, suitable, and occupied habitat. These areas will be avoided during implementation of the HCP; therefore, any effects will be discountable, or any indirect impacts will be insignificant. Effects from related renewable energy are not reasonably certain to occur based on lack of specific wind turbines or solar infrastructure footprints.	• Completion of pre-construction surveys for potentially suitable, suitable, and occupied habitat of blowout penstemon • Avoidance of potentially suitable and suitable habitat for blowout penstemon • Avoidance of areas with occurrences of blowout penstemon • Implementation of Worker Educational Awareness Program regarding federally protected species and their habitats

Species	ESA Section 7 Determination	Rationale	Conservation Measures
Western prairie fringed orchid	Not Likely to Adversely Affect	Pre-construction surveys will be conducted to identify potentially suitable, suitable, and occupied habitat. These areas will be avoided during implementation of the HCP; therefore, any effects will be discountable, or any indirect impacts will be insignificant. Effects from related renewable energy are not reasonably certain to occur based on lack of specific wind turbines or solar infrastructure footprints.	• Completion of pre-construction surveys for potentially suitable, suitable, and occupied habitat of Western prairie fringed orchid • Avoidance of potentially suitable and suitable habitat • Avoidance of identified occurrences • Control of erosion and sediment runoff • Implementation of Worker Educational Awareness Program regarding federally protected species and their habitats
Tricolored bat	Not likely to jeopardize the continued existence of the species (proposed species)	There are no documented occurrences of this species or hibernacula in the action area, likely due to the lack of contiguous suitable forested habitat. Minor temporary disturbance during construction and maintenance activities is possible, but the likelihood of impacts is discountable given the low habitat acreage and avoidance of activities during the species' summer occupancy period. Effects from related renewable energy are not reasonably certain to occur based on lack of specific wind turbines or solar infrastructure footprints.	• No tree clearing will occur during the summer occupancy period (April 1 – September 30) • Routine operation and maintenance activities will be scheduled during the ABB inactive season, which coincides with bat winter hibernation • Potential roost trees would not be removed by routine operation and maintenance activities during the summer occupancy period (April 1 – September 30) • Implementation of Worker Educational Awareness Program regarding federally protected species and their habitats
Suckley's Cuckoo Bumble Bee	Not likely to jeopardize the continued existence of the	There are no documented occurrences of this species in the action area, likely given the low likelihood of the species	• Avoidance of subirrigated wet meadows and mesic grassland habitats

Species	ESA Section 7 Determination	Rationale	Conservation Measures
	species (proposed species)	occurring historically in Nebraska. Minor temporary disturbance during construction and maintenance activities is possible, but the likelihood of impacts is also very low given this low likelihood of occurrence and with the implementation of the HCP conservation measures to minimize potential impacts. Effects from related renewable energy are not reasonably certain to occur based on lack of specific wind turbines or solar infrastructure footprints.	• Scheduling certain construction activities in designated areas during the ABB inactive season (December 1 – February 28) • Use existing roads and two-tracks for construction access and use temporary improvements also for access • Restoration of habitat following temporary construction disturbance • Implementation of Worker Educational Awareness Program regarding federally protected species and their habitats • Acquisition and protection of 594-acre high quality grassland habitat for the American burying beetle that is beneficial to bumble bee species

Table 2. Bald and Golden Protection Act Determinations

Species	BGEPA Determination	Rationale	Avoidance/Minimization Measures
Bald eagle	No eagle take permit required. After reviewing the minimization measures in the Migratory Bird Conservation Plan for this Project, the Service's Region 6 Migratory Bird Management Office USFWS stated that the expected risk to bald	Minor temporary disturbance to individuals during construction and maintenance activities may occur but is unlikely due to the seasonal restrictions; likelihood of impacts due to collision would be minimized by adherence with NPPD and APLIC	• No helicopter use within 0.5 mile of active bald eagle nests (during nesting season) • Implementation of Worker Educational Awareness Program • Implementation of the MBCP • Trash removal at construction sites • Seasonal restrictions within 0.5 mile of bald eagle nests and within 0.25 mile of bald eagle

Species	BGEPA Determination	Rationale	Avoidance/Minimization Measures
	eagles is low and take of a bald eagle is not anticipated.	line marking standards and implementation of additional avoidance/minimization measures	winter roosts • Compliance with APLIC standards • Installation of bird flight diverters • Pre-construction surveys for bald eagle nests
Golden eagle	No eagle take permit required Effects on golden eagles would be similar to those described for bald eagles. However, effects on golden eagles would be less likely to occur because this species historically has been reported as occurring only in the western portion of the study area. Risk is low and take is not anticipated.	Minor temporary disturbance to individuals during construction and maintenance activities may occur but is unlikely due to the seasonal restrictions; likelihood of impacts due to collision would be minimized by adherence with NPPD and APLIC line marking standards and implementation of additional avoidance measures	• Implementation of Worker Educational Awareness Program • Implementation of the MBCP • Compliance with APLIC standards • Installation of bird flight diverters • Trash removal at construction sites

The Service anticipates that the implementation of the HCP and the issuance of the incidental take permit to NPPD may result in minor or temporary disturbance to the listed species or their habitat described in Table 1 within the action area. However, adverse effects to these species are not anticipated due to: (1) the avoidance of the species' suitable habitat; (2) the low likelihood of disturbance that may occur as a result of the proposed project; and (3) the application of conservation measures intended to avoid/minimize impacts for each of these species and associated compliance monitoring by NPPD (NPPD 2025, Pg. 141-143). Therefore, these species will not be addressed further in the attached Biological and Conference Opinion.

The Service concludes that issuance of the incidental take permit to NPPD may affect and is likely to adversely affect the ABB. Therefore, the final BO analyzes the effects of incidental take permit issuance on the ABB. The ITS serves to enumerate or identify the amount or extent of take "caused by" all the effects of the action.

If you have any questions regarding this matter, please contact me at the letterhead address or by phone at 308-216-2077.

Enclosure

BIOLOGICAL OPINION AND CONFERENCE OPINION

PROPOSED ISSUANCE OF AN INCIDENTAL TAKE PERMIT FOR THE FEDERALLY ENDANGERED AMERICAN BURYING BEETLE

Nicrophorus americanus

NEBRASKA PUBLIC POWER DISTRICT

R-PROJECT TRANSMISSION LINE

ECOSphere Number: 2024-0060578

Action Agency:

U.S. FISH AND WILDLIFE SERVICE

Mountain Prairie Region

Denver, Colorado

Prepared by:

U.S. Fish and Wildlife Service
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Project Leader, Nebraska Field Office

Table of Contents

1. Introduction

A biological opinion (BO) is the document that states the findings of the U.S. Fish and Wildlife Service (Service, USFWS) required under section 7 of the Endangered Species Act of 1973, as amended (ESA), as to whether a Federal action is likely to:

- jeopardize the continued existence of species listed as endangered or threatened; or
- result in the destruction or adverse modification of designated critical habitat.

A conference opinion (CO) does the same as a BO but addresses proposed species and proposed critical habitats (Section 7(a)(4)) even though the prohibitions of the ESA do not yet apply to the proposed species.

The Federal action addressed in this BO/CO is the Service's proposed issuance of an incidental take permit (ITP, permit, the Action) for the federally-threatened American burying beetle (*Nicrophorus americanus;* ABB). The ITP applicant, Nebraska Public Power District (NPPD), has elected to not seek an incidental take permit for any other species. The Service, through intra-Service consultation, is fulfilling the requirement of section 7 of the ESA. This BO/CO considers the effects of the Action on the ABB, federally-endangered whooping crane (*Grus americana*), federally-proposed threatened monarch butterfly (*Danaus plexippus*), and federally-proposed threatened western regal fritillary (*Argynnis idalia occidentalis*). The Action does not affect designated or proposed critical habitat; therefore, this BO/CO does not address critical habitat.

The Service provides with the determinations that the Action for species with "no effect" or "not likely to adversely affect" conclusions in the transmittal memo of this BO/CO. These determinations fulfilled the Service's responsibilities for the Action under §7(a)(2) of the ESA for these species and critical habitats. Therefore, we do not address further these species and critical habitats in this BO/CO.

BO/CO Analytical Framework

A BO that concludes a proposed Federal action is *not* likely to *jeopardize the continued existence* of listed species and is *not* likely to result in the *destruction or adverse modification* of critical habitat fulfills the Federal agency's responsibilities under §7(a)(2) of the ESA.

> *"Jeopardize the continued existence* means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR §402.02).
> "*Destruction or adverse modification* means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR §402.02).

The Service determines in a BO whether we expect an action to satisfy these definitions using the best available relevant data in the following analytical framework (see 50 CFR §402.02 for the regulatory definitions of *action, action area, environmental baseline, effects of the action*, and *cumulative effects*).

a. *Proposed Action*. Review the proposed Federal action and describe the environmental changes its implementation would cause, which defines the action area.
b. *Status*. Review and describe the current range-wide status of the species or critical habitat.
c. *Environmental Baseline*. Describe the condition of the species or critical habitat in the action area, without the consequences to the listed species caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early consultation, and the impacts of State or private actions which are contemporaneous with the consultation.
d. *Effects of the Action*. Predict all consequences to species or critical habitat caused by the proposed action, including the consequences of other activities caused by the proposed action, which are reasonably certain to occur. Activities caused by the proposed action would not occur but for the proposed action. Effects of the action may occur later in time and may include consequences that occur outside the action area.
e. *Cumulative Effects*. Predict all consequences to listed species or critical habitat caused by future non-Federal activities that are reasonably certain to occur within the action area.
f. *Conclusion*. Add the effects of the action and cumulative effects to the environmental baseline, and in light of the status of the species, formulate the Service's opinion as to whether the action is likely to jeopardize species or adversely modify critical habitat.

A CO follows the same procedures, contents and format as a BO, however, does not have to include an incidental take statement. This CO does not include an incidental take statement. If any of the proposed species become federally listed during the permit term and prohibited take from covered activities is anticipated, the permittee would be required to amend their permit and apply for incidental take coverage (see Section 2.4, *Changed Circumstances*). At that point of a potential amendment, the Service would re-initiate this Section 7 consultation for the species in the proposed amendment.

Consultation History

This section lists key events and correspondence during this consultation. A complete administrative record of this consultation is on file in the Service’s Nebraska Ecological Services Field Office.

- *May 24, 2012*: A teleconference was held with NPPD, Service, and Nebraska Game and Parks Commission (NGPC) to discuss the R-Project as identified in the Southwest Power Pool's Integrated Transmission Plan 10-year Assessment Report.
- *December 12, 2012*: A project coordination meeting was held with NPPD and its consultants, Service, and NGPC to determine if federally listed threatened and endangered species would be covered or evaluated.
- *March 25, 2014 – June 2019*: Regular technical meetings were held with the Service, NPPD and its consultant, and NGPC to discuss project details, conservation measures for covered and evaluated species, permit location and duration, ABB survey results, and method to calculate the total amount of anticipated ABB take. Conference calls between the above parties regarding technical issues were also held in August and September 2013.
- *September 2014 – June 2019*: Monthly teleconferences were held among the Service, NPPD, NGPC, and various consultants to discuss the status and progress of the HCP and other aspects related to preparation of an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA).
- *October 30, 2014*: Service published a Notice of Intent in the Federal Register to inform the public of its intent to prepare an EIS that assesses the impacts on the human environment from the proposed issuance of an ITP to authorize the incidental take of the ABB and implementation of an HCP (79 FR 64619).
- *May 8, 2015*: A coordination meeting was held with the Service, NPPD and consultants. NPPD formally stated that the R-Project could not be constructed unless the Service issued an ITP, which resulted in the broadening of the scope of NEPA analysis.
- *May 29, 2015*: A draft HCP for the previous R-Project route selected by NPPD was provided to the Service and NGPC for review and comment. Consolidated Service and NGPC comments were provided on the draft HCP to NPPD.
- *September 11, 2015*: A meeting was held at the Service's Regional Office in Denver, Colorado to discuss the feasibility of other less impactful route alternatives on federally listed species, migratory birds, and bald and golden eagles.
- *September 30, 2015*: A revised draft HCP for the previous R-Project route selected by NPPD was provided to the Service and NGPC for review and comment. Consolidated Service comments were provided on the draft HCP back to NPPD.
- *May 16, 2016*: A meeting was held at the Service's Regional Office in Denver, Colorado to discuss application by NPPD for a section 10 permit for the whooping crane and to discuss less impactful R-Project route alternatives.
- *April 4, 2017*: A revised version of the draft HCP was prepared by NPPD.
- *May 12, 2017*: Drafts of the EIS, HCP, Migratory Bird Conservation Plan, and Land Restoration Plan were made available for a 60-day public comment period in the Federal Register (82 FR 22153) with a comment period that closed on July 12, 2017.

- *September 7, 2017*: A 60-day public comment period was reopened for drafts of the EIS, HCP, Migratory Bird Conservation Plan, and Land Restoration Plan from September 7, 2017, through November 8, 2017.
- *March 14, 2018*: NPPD obtained the option to purchase a 600-acre parcel to provide mitigation for the impacts of the project to the ABB.
- *February 8, 2019*: Service published a Notice of Availability in the Federal Register to announce the availability of the final EIS, final HCP, and associated documents for the R-Project.
- *June 12, 2019*: Service signed the Record of Decision and issued an incidental take permit to NPPD.
- *June 16, 2020*: U.S. District Court for the District of Colorado identified certain discrete errors in the Service's decision and ruled to vacate and remand the incidental take permit.
- *October 14, 2021 – May 2022*: Regular technical meetings were held with the Service, NPPD and its consultant, and NGPC to discuss project details and updates necessary to HCP, conservation measures for covered and evaluated species, permit location and duration, ABB survey results, and anticipated ABB take.
- *May 12, 2022 – Present*: Biweekly virtual meetings were held among the Service, NPPD, NGPC, and various consultants to discuss the status and progress of the HCP and other aspects related to preparation of the Supplemental Environmental Impact Statement (SEIS) pursuant to the National Environmental Policy Act (NEPA).
- *November 18, 2022*: Service published a Notice of Intent in the Federal Register to inform the public of its intent to prepare a SEIS that assesses the impacts on the human environment from the proposed issuance of an ITP to authorize the incidental take of the ABB and implementation of an HCP (87 FR 69294).
- *February 9, 2024*: Services publishes a Notice of Availability for the drafts of the SEIS, HCP, Migratory Bird Conservation Plan, and Land Restoration Plan in the Federal Register (89 FR 9171) for a 90-day public comment period that included a 30-day extension (89 FR 24025) with a comment period that closed on May 9, 2024.
- *February 27, February 29, and March 7, 2024*: The Service holds in-person public meetings in Nebraska and a virtual public meeting on the draft SEIS, HCP, and other available documents.
- *January 30, 2026*: The Environmental Protection Agency publishes the Notice of Availability for the Service's final SEIS in the Federal Register.

2. Proposed Action/Covered Activities

Description of Proposed Action

The Federal action the Service is evaluating in this BO/CO is the Service's issuance of a section

l0(a)(l)(B) ITP to NPPD exclusively for the incidental take of ABB associated with the 226-mile long, 345-kilovolt transmission line from NPPD's Gerald Gentleman Station (GGS) Substation near Sutherland to NPPD's existing substation east of Thedford. The north/south segment is 101 miles long and starts at the GGS Substation near Sutherland, proceeds north across the South Platte and North Platte rivers, continues north for approximately eight miles before turning east for 30 miles, crosses Birdwood Creek, and extends eastward to meet with U.S. Highway 83. The north/south segment then parallels U.S. Highway 83 and connects to a new expansion of NPPD's existing substation east of Thedford. The east/west segment is 125 miles long and starts at the Thedford Substation expansion and proceeds east to State Highway 7 north of Brewster. The east/west segment then proceeds north along State Highway 7 for approximately five miles then turns east to its terminus at Western's Fort Thompson to Grand Island transmission line at the Holt County Substation located in the southeast corner of Holt County.

As part of the requirements for obtaining an ITP, NPPD has prepared an HCP (NPPD 2025) in coordination with the Service. The requested 50-year ITP term will cover the operational life of the project. A 50-year permit duration provides take coverage for construction of the R-Project, as well as emergency repairs that may be required throughout the life of the transmission line.

As defined in the ESA section 7 regulations (50 CFR 402.02), "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part by Federal agencies in the United States or upon the high seas." Examples of Federal actions include but are not limited to: (a) actions intended to conserve listed species or their habitat; (b) the promulgation of regulations; (c) the granting of licenses, contracts, leases, easements, right -of-ways, permits, or grants-in-aid; or (d) actions directly or indirectly causing modifications to the land, water, or air.

Description of Proposed Covered Activities

Covered Activities are those that are likely to result in incidental take of ABB and would be authorized by the ITP. Further details describing these activities, as well as those project activities that would not result in take, can be found in Chapter 2 of the HCP, Section 2.4 of the Final EIS, and Section 3.1.1 of the SEIS, which are hereby incorporated by reference.

Covered Activities for the R-Project are those associated with the construction and emergency repairs for the proposed transmission line and are summarized below in Table 1. Table 1 provides a list of each covered activity associated with the R-Project and the estimated temporary and/or permanent acreage associated with each activity. Temporary impacts are disturbances to ABB habitat that will later be restored following the methods and activities described in the Restoration Management Plan (NPPD 2025).

The permit area is the geographical area within which incidental take of ABB resulting from covered activities is expected to occur. The permit area from Stapleton to the Thedford

Substation includes one mile on either side of the R-Project centerline (two miles wide total), while the permit area from the Thedford Substation to the Holt County Substation includes four miles on either side of the R-Project centerline (eight miles wide total). The varying permit area width incorporates all potential impacts occurring outside the transmission line right-of-way (ROW) including construction access and construction yards.

Table 1. Temporary and Permanent Disturbance Estimates for Covered Activities within the Permit/Action Area for ESA section 7 (NPPD 2025).

COVERED ACTIVITY	ESTIMATED TEMPORARY DISTURBANCE (ACRES)	ESTIMATED PERMANENT DISTURBANCE (ACRES)
CONSTRUCTION		
Access		
Temporary Access	387	--
Permanent Access[1]	--	19
ROW Preparation		
ROW Tree Clearing[2]	22	--
Temporary Work Areas		
Fly Yards/Assembly Areas	221	--
Construction Yards/Staging Areas	38.5	--
Pulling and Tensioning Sites	251	--
Temporary Structure Work Areas		
Lattice Tower	103	--
Steel Monopole	173	--
Structure Foundation Excavation/Installation		
Helical piers – lattice tower	--	0.61
Standard foundation – steel monopole	--	0.25
Construction Contingency		
Construction Contingency	40	--
Distribution Power Line Relocation		
Distribution power line relocation	13.6	0.02
Well Relocation		
Well relocation	0.4	--
Construction Subtotal	**1,249.5**	**19.86**
OPERATION AND MAINTENANCE		
Emergency Repairs[3]	250	--
TOTAL	**1,499.5**	**19.86**

[1]Temporary access routes may be left in place following completion of construction depending on landowner requests and requirements for operation and maintenance of the line. These routes would then be classified as permanent access and represent a permanent impact. No more than 19 acres of permanent access will be left in place in the Permit Area following construction.
[2]Trees will not be allowed to re-grow within ROW. ROW will be converted to grassland.
[3]Disturbance from emergency repairs is estimated at 20% of the construction subtotal in the Permit Area. Disturbed areas would be restored if conditions require restoration efforts.

2.1 Project Design and Construction

Electrification of the transmission line would occur approximately 21 to 24 months after reinitiating construction. The general sequence of construction for the R-Project is described

below. Various phases of construction will occur at different locations throughout the construction process. This will require several crews operating at the same time at different locations.

Transmission Line Design

The Right-of-Way (ROW) width will typically be 200 feet (100 feet each side of the centerline) for the entire transmission line unless otherwise specified. Two types of structures will be used for this transmission line: tubular steel monopoles and steel lattice towers. Tubular steel monopoles are typically employed on most NPPD projects but require large equipment to install and will be used along the transmission line route where major access roads exist, including U.S. Highway 83. Tubular steel monopole structures will be placed approximately 1,350 feet apart (average ruling span) with a nominal structure height of 150 feet. The average ruling span means the "standard, typical, or expected" span distance while specific spans may be increased or decreased depending on a specific situation or condition.

Steel lattice towers will be used in areas of the Sandhills where existing access roads are limited or do not exist, due to construction advantages in transportation and installation of these structures. Lattice towers can be constructed with less overall impact to the surrounding area with the use of smaller equipment and helicopter construction. Span lengths between lattice towers will be the same as monopoles with a nominal structure height of 130 feet.

To protect the 345 kV transmission line conductors from direct lightning strikes, two lightning-protection shield wires, also referred to as ground wires, will be installed on the tops of each structure utilizing specialized shield wire connection brackets or arms. Other hardware not associated with the transmission of electricity may be installed as part of the R-Project. This hardware may include large-diameter aerial marker balls near airports or aircraft warning lighting as required for the conductors or structures per Federal Aviation Administration (FAA) regulations. Aircraft warning lighting is typically only required on structures over 200 feet tall. Structure proximity to airports and structure height are the determinants of whether FAA regulations will apply based on an assessment of FAA criteria. NPPD does not anticipate that structure lighting will be required because proposed structures will be less than 200 feet tall and will be located to avoid airport impacts to the greatest extent practicable. However, if special circumstances (e.g., tall crossings) require structures taller than 200 feet, FAA regulations regarding lighting and marking will be followed.

NPPD will install bird flight diverters on all 226 miles of the R-Project. NPPD will also mark at least 124 miles of existing line, which is equal to the amount of the R-Project within one mile of potentially suitable stopover habitat. Existing lines that have the potential for marking include the 115 kV transmission line between Thedford Substation and the Ainsworth Substation, lines

within the federally designated Whooping Crane Critical Habitat along the Platte River, and lines in Pearse et al. (2015) extended-use core intensity areas.

NPPD construction standards call for the placement of spiral bird flight diverters at 50-foot intervals alternating on opposite shield wires. This application is within the recommended spacing per Avian Power Line Interaction Committee (APLIC) guidance (APLIC 2012) and will increase protection against potential collisions. The NPPD construction standard is based upon available information on the effectiveness of marker types, durability of markers, and the engineering constraints of the line. NPPD intends to use two types of bird flight diverters for the R-Project. Portions of the R-Project that will be marked with the reflective and glow-in-the-dark avian flight diverters include river crossings and areas identified as areas of bird use during low-light conditions. Consultation with USFWS has determined approximately 10 to 15% of the R-Project proposed line marking will require reflective avian flight diverters. The remainder of the R-Project proposed line marking will use spiral bird flight diverters.

Substation Design

The R-Project will require (1) construction of a new 345 kV bay within the existing GGS Substation footprint; (2) construction of a new 345 kV substation expansion at the existing Thedford 115 kV substation; and (3) installation of line bay terminal equipment at the Holt County Substation.

The GGS Substation is located in Lincoln County, just south of Sutherland Reservoir State Recreation Area and north of West Power Road. The substation will be expanded within its existing footprint. Expansion will include installation of the following major equipment: 345 kV breaker, 345 kV reactor, and 345 kV dead-end structure.

The Thedford Substation expansion site is located in Thomas County, east of Thedford, west of the existing Thedford 115 kV Substation and north of State Highway 2. NPPD completed the groundwork for the expansion of the Thedford Substation, which encompassed approximately 13 acres, in 2020 under ITP #TE72710C-0 (see Sections 1.1 and 6.2.2). The site currently includes a lined and graveled footprint where future substation components will be erected, a control building, a transformer, 345 kV reactors, the ground grid, an exterior chain-link security fence, and permanent all-weather access off State Highway 2.

The Holt County Substation is located in Holt County on the northwest corner of the intersection of 846th Road and 510th Avenue. SPP's November 4, 2021, Notice to Construct removed the construction of the Holt County Substation from the R-Project. The revised Notice to Construct includes adding the line bay terminal equipment necessary to connect, commission, and operate the 345 kV R-Project, which will occur within the footprint of the substation.

Communications Systems

The R-Project will require a number of telecommunications support systems. The primary communications for protection will be Power Line Carrier over the power line. The secondary communications for protection and control are proposed to be provided via the one optical ground wire installed in a shield wire position on the transmission line. The optical data signal degrades with distance as it travels through the optical fiber cable. Consequently, signal-regeneration sites are required to amplify the signals if the distance between stations or regeneration sites exceeds approximately 40 to 70 miles. In total, three regeneration sites will be required for the proposed R-Project. Regeneration communication sites will be located within the transmission line ROW, along existing roads, and along existing distribution power lines. Each site will consist of a cabinet (72 inches high, 45 inches wide, 27 inches deep) placed within the transmission line ROW. Power will be supplied to each regeneration site by existing adjacent distribution power lines. One regeneration site will be located in Lincoln County at the intersection of U.S. Highway 83 and Auble Road. One regeneration site will be located along State Highway 7 where the R-Project proceeds east away from the road. The third regeneration site will be at the intersection of State Highway 11 and the R-Project.

In addition to protection and control, the communications system will be used for Supervisory Control and Data Acquisition (SCADA). The SCADA system is a computer system for gathering and analyzing real-time data that are used to monitor and control the transmission system (substation equipment and the line itself).

Access

The R-Project will maximize use of existing roads and two-tracks wherever feasible for accessing structure locations during construction to minimize ground disturbance. Large areas of the Sandhills do not have an existing road network, such as section line roads. In these areas, temporary access routes have been designated for construction access. The alignment of temporary access routes will follow the existing landform contours in designated areas where practicable, providing that such alignment does not impact other sensitive resources.

Consideration of access begins where construction equipment leaves the existing maintained road network. Access to structure locations, fly yard/assembly areas, pulling and tensioning sites, and other temporary work areas is broken down into two categories:

- **Temporary Access** – All construction-related travel off currently existing and maintained roads is included under temporary access. Temporary access includes the use of overland travel, creation of new access paths, and improvement of existing two-tracks for construction. All temporary access routes have an assumed width of 16 feet, although the final width will be dependent on terrain. All improvements will be restored at the end of construction based on the requirements specified in the HCP. Compacted areas may be disced or ripped to loosen soil prior to reseeding. Areas where a sidehill is flattened for

safety during construction access will not be recontoured to allow future maintenance access, if necessary, but will be reseeded.

- **Permanent Access** – Permanent access includes new improvements that will be left in place and not restored and revegetated following completion of construction activities. Permanent access will be used at substation locations and specific circumstances where improvements may be left in place at the landowner's request following the completion of construction. NPPD will create no more than 26 acres of new permanent access for the entire project and no more than 19 acres of new permanent access in the permit area (see Section 2.7.1 for description of permit area), including those left in place at the landowner's request.

Equipment used in the construction of access improvements may include, but is not limited to, bulldozers, front-end loaders, dump trucks, backhoes, excavators, graders, roller compactors, water trucks, crane trucks, and light vehicles.

Any bridges and/or culverts installed for stream or wetland crossings will be removed upon completion of construction. Any temporary culverts installed will maintain the existing hydrology of the drainage and will not alter or impede flow.

NPPD established 3.44 acres of temporary access via the placement of construction matting under ITP #TE72710C-0 (see Section 5.1.1). These construction mats have been removed, and the area underneath has been restored to native vegetation.

ROW Preparation

Construction survey work for the R-Project consists of determining or refining the centerline location through updated electronic and aerial survey techniques, specific pole locations, ROW boundaries, and temporary work areas (fly yards/assembly areas and construction yards/staging areas) boundaries. Equipment used in surveying and staking may include, but is not limited to, light vehicles and all-terrain vehicles (ATV) and similar-type vehicles. Surveying and staking activities were completed on properties with signed ROW easement agreements in 2019. However, stakes that remain on the landscape for prolonged periods of inactivity may be damaged or knocked over by cattle or the elements. All areas will be revisited and restaked, if necessary, prior to the initiation of construction.

Since the Sandhills landscape is primarily grassland, vegetation removal within the 200-foot-wide ROW will be minimal. Removal of mature trees under or near the conductors will be done to provide adequate electrical clearance as required by NPPD's Transmission Vegetation Management Standard No. OGT&D-St-002. This standard is based on NERC and NESC standards for maintaining reliability of electrical facilities. Tree clearing will be completed outside of the migratory bird nesting season to the extent practicable. If clearing must be

completed during the migratory bird nesting season, clearance surveys conducted by a qualified biologist will be completed prior to tree removal to identify occupied nests for avoidance. Equipment used to clear trees under or near conductors may include, but is not limited to, ATVs, brush mower/shredders, light vehicles, mechanized feller/bunchers, and grapple skidders. Feller/bunchers are motorized vehicles with an attachment that can rapidly cut and gather trees before felling them. A skidder is a vehicle used for pulling cut trees out of an area.

After the ROW boundaries are staked and pole locations are marked, trees within the ROW zone that have the potential to come into contact with the line will be cleared. In addition, danger trees will be identified and removed during initial ROW clearing. "Danger trees" are trees or tree limbs that, although located off of the transmission line ROW (and thus outside of normal clearing limits), are of such height; condition (e.g., leaning, rotted); location (e.g., side hill, proximity to transmission lines, soil characteristics); and/or species type that they represent a threat to the integrity of the transmission line conductors, pole structures, or other facilities. Tree stumps will be cut to grade and remain unless the landowner requests removal. Herbicides may be applied directly to tree stumps to prevent regeneration. Application of restricted-use herbicides would be approved by USFWS and NGPC and would be applied by a licensed applicator.

An estimated 42.1 acres of tree clearing remain necessary for the R-Project. Tree clearing was estimated using laser imaging, detection, and ranging (more commonly referred to as LIDAR) aerial imagery taken specifically for the R-Project ROW to digitize the overall crown area. The actual areas of ground disturbance associated with ROW tree clearing may be less than 42.1 acres, given the estimate is based on aerial imagery of the overall crown area and not the actual tree trunk at the ground. NPPD previously cleared approximately 6.9 acres of trees under ITP #TE72710C-0.

Temporary Work Areas

Fly Yards/Assembly Areas and Construction Yards/Staging Yards/Batch Plants and Borrow Areas

Temporary work areas will be required for materials and equipment storage and staging for construction activities. The construction yards/staging areas will serve as field offices, reporting locations for workers, parking space for vehicles and equipment, storage of construction materials, and fabrication and assembly. Fly yards will be used for helicopter construction where materials and equipment are loaded into slings or choker cables for transport and placement at structure locations via helicopter. Fly yards will be located within the same footprint of lattice tower assembly areas. Fly yards/assembly areas and construction yards/staging areas will be located along existing access roads and in previously disturbed areas when practicable. Grading and fill or the placement of construction matting on these sites may be required to prevent soil

erosion and sediment runoff or soil compaction. Equipment used to construct and operate within fly yards/assembly areas and construction yards/staging areas may include, but is not limited to, earthmoving equipment, a heavy crane, semi-trucks, helicopters, and support vehicles. Upon completion of R-Project construction, all fill materials including gravel will be removed, soils will be decompacted (if necessary), and the area will be revegetated to the appropriate specifications.

Sixteen fly yards/assembly areas were established in 2019; however, only a small portion of these yards was used at that time. Construction matting was placed on 4.73 acres of fly yards/assembly areas in 2019 and 2020. The construction matting was removed from these yards, and the area covered by mats was revegetated in 2022. Cattle-exclusion fencing installed at these yards remains in place. The full extent of the fly yards/assembly areas will be used when construction resumes. Four construction yards/staging areas were established in 2019. Like the fly yards/assembly areas, only a small portion of these yards was used at that time. Construction matting, overland travel, and material storage impacting approximately 11.5 acres occurred in 2019. These construction yards/staging areas remain in place currently and house construction materials such as anchor bolt cages, crane mats, and construction matting.

If needed, any new batch plants or borrow areas will be sited in previously disturbed locations, where available, and will not be located in environmentally sensitive areas, including threatened and endangered species habitat, wetlands, or cultural resource areas.

Pulling and Tensioning Sites/Structure Work Areas

At each structure location, a temporary work area will be needed for construction lay-down, structure assembly, and structure erection. To the extent necessary, the work area will be cleared of vegetation and bladed to create a safe working area for placing equipment, vehicles, and materials. In grassland areas, little, if any, clearing of vegetation will be needed. The ground disturbance required for lattice tower work areas is 100 feet by 100 feet and for steel monopole work areas is 200 feet by 200 feet. After line construction, all areas not needed for normal transmission line maintenance will be graded to blend as near as possible with the natural contours, then revegetated.

Equipment that may be used to prepare structure work areas varies depending on the structure type. Lattice towers can be constructed with lighter equipment and helicopters and thus may not require a prepared structure work area. Steel monopole structures require heavier equipment in relation to lattice towers and will likely require some improvement to the structure work area, such as construction matting or leveling, to support construction. Equipment used to prepare structure work areas may include, but is not limited to, small Bobcat-sized earthmoving equipment.

Wire pulling and tensioning sites are locations where specialized equipment, including winch trucks, light crawler tractors, or excavators, is used to spool out and tension the conductors and shield wires. Along tangent sections of the line, pulling and tensioning sites will be located approximately every two to four miles for steel monopoles and four to six miles for lattice towers. Pulling and tensioning sites will require two acres of temporary disturbance. Additional pulling sites are needed where major turns in the line occur. These angle structure or point-of-intercept sites will require pulling and tensioning in two directions to allow for the angle in the line. Wire pulling and tensioning sites will be cleared and bladed only to the extent necessary to perform construction activities safely. Equipment used at pulling and tensioning sites may include, but is not limited to, semi-trucks, tensioner pullers (large machine winch), heavy cranes to move reels, and matting to level the site. The use of helicopters to support pulling and tensioning is currently being evaluated.

Structure Foundation Excavation/Installation

Excavation will be required for the steel monopole structure foundations. Foundation holes will be excavated using a truck- or excavator-mounted auger. The poles will be installed on drilled pier concrete foundations to a depth of approximately 25 to 45 feet depending on load and soil characteristics. All monopole structures will utilize cast-in-place concrete footings. Cast-in-place footings will be installed by placing reinforcing steel in excavated foundation holes and encasing it in concrete. Concrete will be delivered to the site in concrete trucks. Chute debris from concrete trucks will be washed at an approved location, and the debris will be hauled offsite and disposed of in non-environmentally sensitive areas after it hardens. Equipment that may be used to excavate and install steel monopole foundations may include, but is not limited to, truck- or excavator-mounted augers, dump trucks (to remove spoils from site), concrete trucks, trucks and trailers (to drop off rebar and anchor bolt cage), heavy cranes, backhoes, water trucks (for dewatering), and light support vehicles.

Excavated holes left open or unguarded will be covered and/or fenced where needed to protect the public, livestock, and wildlife. Any remaining spoils will be stockpiled at the localized work site and used to backfill holes. All remaining spoils not used for backfill will be hauled offsite and disposed of in non-environmentally sensitive areas.

Screw-in helical pier foundations will be used for lattice tower structures, in areas of the Sandhills where existing access roads do not exist. Helical pier foundations do not require excavation. Each leg of the lattice tower will require a helical pier foundation (four legs total). Final designs have not been completed, but it is anticipated that each foundation will consist of three or four 7- to 12-inch diameter piles that are 20 to 40 feet in length. The helical piers are installed with an excavator that has a torque head where the bucket usually is located. The piers are screwed into the ground, and no spoils need to be removed from the site. Once the piers are installed, the piers are cut to the correct grade and elevation, and then a cap that connects to the

tower leg is welded or bolted on. Anchor bolts or stub angles are used to secure the structure to the foundation. Due to the cutting and welding to be performed at each site, NPPD will require the construction contractor to provide fire protection. It is anticipated that the construction contractor will have a water tank and fire extinguishers onsite during these activities along with using additional prevention measures such as fireproof roll-up mats and welding tents. Equipment that may be used to install screw-in helical pier foundations may include, but is not limited to, tracked excavators, light trucks and trailers, weld trucks, water trucks (for fire suppression), and light support vehicles.

Transmission Structure Assembly and Erection

Generally, tubular steel structures will be assembled and framed at each structure work area. For tubular steel monopoles, work areas need to be large enough to accommodate laying down the entire length of the poles while pole sections are assembled and cross-arms are mounted. Typically, insulators, strings, and stringing sheaves are then installed at each conductor and ground-wire position while the pole is on the ground. Stringing sheaves are used to guide the conductor during the stringing process for attachment onto the insulator strings. The assembled pole will then be placed on the foundations and erected into place by a crane. Equipment used to erect steel monopole structures may include, but is not limited to, heavy cranes, bulldozers, bucket trucks, semi-trucks (to deliver structure tubes), and light support vehicles.

For lattice tower construction, the typical sequence begins with delivery of the materials needed to construct the base to the structure location. Material will be delivered in bundles, and the base will be erected in place with a small crane. The remainder of the lattice tower will be assembled, in sections, at the fly yard/assembly areas. In addition, the structures will have the insulator strings and stringing sheaves pre-assembled and attached at each shield (ground) wire and conductor position. These sections will then be flown to the structure site with a helicopter. Depending on the construction contractor's work plan, two or three sections will be needed to complete the entire tower. Assembly of the lattice tower sections and hardware in a fly yard/assembly area negates the need to have a large crane and heavier equipment at each structure location. Equipment that will be used to assemble the lattice tower sections within the fly yard/assembly area may include, but is not limited to, small cranes and additional support equipment such as a forklift.

Stringing of Conductors, Shield Wire, and Fiber Optic Ground Wire

Once the structures are in place, a "sock-line" will be pulled (strung) from structure to structure and threaded through the stringing sheaves on each structure by helicopter. If necessary, in longer, high-tension stringing sections, a second larger-diameter and stronger line will be attached to the sock-line and strung prior to the attachment of the conductor and the shield wires.

This process will be repeated until the shield wire, optical ground wire, and conductor are pulled through all sheaves.

Shield wires, OPGW, and conductors will be strung using powered pulling equipment at one end and powered braking or tensioning equipment at the other end of a conductor segment. These sites may differ in size and dimensions depending on the structure's purpose (e.g., mid-span or dead-end), site-specific topography, and whether anchoring of the shield wire or conductor will be located at these sites. The tensioner, in concert with the puller, will maintain tension on the shield wires or conductor while they are fastened to the towers. Once each type of wire has been pulled in, the tension and sag will be adjusted, stringing sheaves will be removed, and the shield wires and conductors will be permanently attached to the insulators.

Splicing will be required at the end of conductor and shield wire spools during stringing. Compression fittings or implosive-type fittings will be used to join the conductors and shield wires. Implosive splicing technology is a splicing technique where a small amount of explosive is placed around an aluminum sleeve. The detonation of a compression fitting creates a flash and a loud boom similar to the sound at the end of a barrel of a 12-gauge shotgun blast or a thunderclap (about 150 decibels) with the decibel level reducing with distance. The location of implosive splicing is unknown at this time and will be determined during construction depending on the length of each conductor reel. Optical ground wire fibers will be spliced together in an enclosure mounted on a structure. The splicing will occur at structure work areas or pulling and tensioning sites.

At tangent and small-angle towers, the conductors will be attached to the insulators using clamps. At the larger-angle dead-end structures, the conductors are cut and attached to the insulator assemblies by "deadening" the conductors, either with a compression fitting or an implosive-type fitting. When utilizing the implosive-type fitting, private landowners and public safety organizations will be notified before proceeding with this method.

For safety and efficiency reasons, wire stringing and tensioning activities are typically performed during daylight hours and are scheduled to coincide to the extent practical with periods of least road traffic to minimize traffic disruptions. For protection of the public during stringing activities, temporary guard structures will be erected at road and overhead line crossing locations where necessary. Guard structures will consist of H-frame wood poles placed on either side of the crossing to prevent ground wires, conductors, or equipment from falling on underlying facilities and disrupting road traffic. Typically, guard structures are installed just outside of the road ROW. Although the preference is for access to each of these guard structures to be located outside the road ROW, it may be necessary for access to be within the road ROW depending on topography and access restrictions imposed by the regulatory agency (Nebraska Department of Transportation, county road and bridge department, etc.). Access use within the road ROW will

be performed in compliance with the stipulations of the crossing permit and regulatory agency requirements.

Construction Waste Disposal

Construction sites, material storage yards, and access routes will be kept in an orderly condition throughout the construction period. Refuse and trash will be removed from the sites and disposed in an approved manner. No open burning of construction trash will occur. In remote areas, trash and refuse will be removed to a construction staging area and contained temporarily until such time as it can be hauled to an approved site. Oils or chemicals will be hauled to an approved site for disposal. Potential contaminants such as oils, hydraulic fluids, antifreeze, and fuels will not be dumped on the ground, and all spills will be cleaned up. The construction contractor will prepare a Spill Prevention and Response Plan that will describe the measures that will be implemented during construction to prevent, respond to, and control spills of hazardous materials, as well as measures to minimize a spill's effect on the environment.

Construction Contingency

Construction contingency is identified here because there may be instances during construction where additional work that could not have been predicted becomes necessary. The construction contingency may include any of the Covered Activities identified in Table 1 and may require additional work following the initial construction effort. An example of a construction activity that would fall under the construction contingency category would be the relocation of an access route or work area developed for construction purposes that became flooded during the course of construction. Other instances that may trigger the construction contingency include, but are not limited to, unforeseen sensitive-resource discoveries, landowner changes to the existing land use that necessitate a change in the construction process, or NPPD's accommodation of landowner requests that result in minor changes in the construction process. While the exact location of construction contingency cannot be predicted, NPPD will limit disturbance under this category of activities to a maximum of 40 acres.

Site Restoration

The R-Project's restoration planning team, private landowners, local Natural Resources Conservation Service (NRCS) offices, and other rangeland experts were consulted regarding the appropriate methods, seed mixes, and rates to restore vegetation in areas disturbed by construction activities. All practical means will be used to restore the land, outside the minimum areas needed for safe operation and maintenance, to its original contour and natural drainage patterns. NPPD has established an Escrow Account to ensure the implementation and success of restoration efforts. The Restoration Management Plan includes stipulations for successful restoration criteria and steps that would be taken in the event restoration does not meet the stipulations.

Substation Construction

GGS Substation

As noted in the *Substation Design* section above, some R-Project-related activities have already occurred at the GGS Substation.

These activities include the following.

- Removal of a portion of existing perimeter fence.
- Installation of rock over expansion area (approximately 1,300 square feet or 0.03 acre).
- Installation of an oil containment structure within the original substation footprint to prevent reactor oil from reaching the ground or water bodies in the event of rupture or leak.
- Installation of concrete reactor pad foundation, ground grid, and conduit.
- Delivery and installation of reactor.
- Installation of control cable for monitoring reactor.
- Delivery and staging of steel poles and other miscellaneous parts and supplies for future installation.
- Installation of perimeter chain link fence around the expansion area.

Work that remains to be completed at the GGS Substation includes the following.

- Installation of concrete piers for steel poles and anchoring structures.
- Installation of foundations for bus, switch, and metering stands.
- Installation of steel, bus, switches, breakers, arrestors, and all other associated electrical components required for substation operation.

All remaining work will be performed within the existing footprint of the GGS Substation.

Thedford Substation

Like the GGS Substation, some R-Project-related activities have already occurred at the Thedford Substation. Work that has been completed includes the following activities.

- Survey work and geotechnical sample drillings to determine foundation requirements and soil resistivity measurements used in the final design phases of the station.
- Grubbing and reshaping the grade to form a relatively flat (1.0% slope) working surface.
- Construction of permanent all-weather access.
- Erection of an eight-foot-tall permanent chain link fence around the perimeter of the substation to prevent unauthorized personnel from accessing the substation.
- Compaction of excavated and fill areas to the required densities to allow structural foundation installations.

- Installation of oil-containment structures to prevent oil from transformers, reactors, circuit breakers, etc., from reaching the ground or water bodies in the event of rupture or leak.
- Installation of foundations, the ground grid, transformers, reactors, and the control building.
- Placement of a crushed-rock surface on the subgrade to make for a stable driving and access platform for the maintenance of equipment.

Work that remains to be done at Thedford Substation includes the following activities.

- Steel structure erection.
- Installation of substation components including bus, switches, breakers, arrestors, and all other associated electrical components.
- Installation of area lighting.
- Testing of the various systems.
- Energization of the facility.
- The steel structure erection will overlap with the installation of the insulators and bus bar, as well as the installation of the various high-voltage apparatus typical of an electrical substation. The energization of the facility generally is timed to take place with the completion of the transmission line work and other required facilities.

Holt County Substation

With the exception of future installation of certain equipment, the construction of the Holt County Substation is no longer part of the R-Project as a result of SPP's November 4, 2021 revised Notice to Construct. Future activities related to the R-Project at the Holt County Substation include the work associated with the line bay installation to accommodate the incoming R-Project line, including installation of a 345 kV breaker, 345 kV reactor, and 345 kV dead-end structure. All remaining work will be performed within the completed footprint of the Holt County Substation.

Helicopter Construction

The type of helicopters needed and the duration that they may be used are dependent on the selected contractor's overall approach to project construction and the availability of equipment. Helicopter construction techniques will be used for the erection of lattice towers, stringing of conductor and shield wire sock line, and other R-Project construction activities. The use of helicopters for other structure erection is evaluated based on site- and region-specific considerations including access to structure locations, sensitive resources, permitting restrictions, construction schedule, weight of structural components, time of year, elevation, availability of heavy lift helicopters, and/or construction economics. Helicopter erection of structures is a viable option for all locations that do not prohibit or restrict helicopter use. Helicopter fly yards will be

located within the same footprint of lattice tower assembly areas and will be referred to as fly yards/assembly areas.

When helicopter construction methods are employed, the structure assembly activities will be based at a fly yard/assembly area. Prior to installation, each lattice tower will be assembled in multiple sections at the fly yard/assembly area. Bundles of steel members and associated hardware are transported to the appropriate fly yard/assembly area by truck and stored. The steel bundles are opened and laid out by component section and then assembled into structure subsections of convenient size and weight according to the helicopter's lifting capabilities.

After assembly at the fly yard/assembly area, the complete tower or tower section will be attached by cables from the helicopter to the top of the tower section and airlifted to the tower location. The lift capacity of helicopters is dependent on the elevation of the fly yard/assembly area, the tower site, local weather conditions, and the intervening terrain.

Helicopter flights used in the construction of power lines are covered under visual flight rules and do not require the filing of formal flight plans with the FAA. However, the helicopter pilots and construction contractor will develop an internal daily flight plan for the preferred flight path of that day's activities. Daily flight plans will likely be developed one to two days prior to the placement of structures and are heavily dependent on local weather conditions and topographic features. The daily flight plan will follow the safest and most direct route possible between the fly yard/assembly area and structure locations. Sensitive features that will be avoided by the daily flight plan may include, but are not limited to, occupied homes, businesses, concentrations of cattle, active bald eagle nests, and large concentrations of waterfowl or cranes. Flight altitudes are dependent on weather conditions, topography, and the load being lifted; however, they are typically between 500 and 1,000 feet.

Current estimates are that a single helicopter could successfully erect seven to nine structures in one day. Multiple helicopters may be employed at one time to facilitate construction activities at different locations along the route. The use of multiple helicopters is dependent on the contractor and may or may not be employed. Helicopters will use temporary work areas such as fly yards and staging areas for landing, overnight storage between flights, and refueling. Each fuel truck will be equipped with automatic shutoff valves and will carry spill kits. In addition to the required preventive spill measures, matting or the use of a water truck may be required to spray the site to reduce dust.

Other R-Project construction activities potentially facilitated by helicopters may include delivery of personnel, equipment, and materials to structure work areas, hardware installation, and pulling shield wire and conductor sock lines. Helicopters will also be used to support the inspection and management of the R-Project by NPPD. The use of helicopters for pulling shield wire and

conductor sock lines is the normal and expected construction technique for wire stringing on both lattice tower and tubular steel monopole sections of the line. Helicopters used for pulling shield wire and conductor sock lines are typically much smaller than the heavy-lift helicopters used to set lattice structures. Helicopters could be used to deliver fly-in portable water tanks (large collapsible bladders) to each lattice tower during periods of active construction to assist with fire prevention.

Distribution Power Line Relocation

The selected route for the R-Project overlaps with approximately 28 miles of existing overhead distribution power lines owned and operated by various rural utility providers. Relocation of these distribution lines is necessary for safety reasons and can be accomplished by relocating them as an overhead or underground line. Of these 28 miles of existing distribution power lines, 19 miles were relocated under ITP #TE72710C-0, while 4.5 miles of underground and 4.5 miles of overhead distribution line relocation have yet to be completed. This remaining work could conservatively result in an additional 13.6 acres of temporary disturbance and 0.02 acre of permanent disturbance (Table 1). Due to power-line spacing regulations required for maintaining facilities, the existing distribution power lines will be relocated outside the R-Project ROW or to the extreme edge of the R-Project ROW. These lines will not be moved far from their current location. For example, those lines along public roads will be moved to the other side of the road.

Distribution power line poles are much smaller than those used for transmission lines and have smaller ROW and span lengths. The average span length for distribution power poles is 200 feet. Relocation of existing overhead distribution lines will require a single line truck called a digger-derrick truck. The digger-derrick truck includes an auger to drill the hole for a three-foot-diameter wood power pole and a small crane to lift the pole into place. Each distribution structure will require a 2,400-square-foot (40 x 60 feet; 0.06 acre) work area where the digger-derrick truck will be parked and the wood pole structure and insulators will be assembled. The digger-derrick truck will move down the distribution line ROW via overland travel and will not require access improvements.

Installation of underground distribution lines will require a small-track trenching machine that uses a knife or vibrating plow that cuts a six-inch slit in the ground as it lays a small-diameter utility cable or pipe. The oscillation of the blade makes the excavation faster and more efficient than a static blade. No spoils are cast to the side, and all soil is replaced by the same machine. A 14-foot-wide travel path is assumed for the trenching machine to move down the underground distribution line ROW. NPPD relocated 19 miles of distribution power lines under ITP #TE72710C-0 (15.5 miles as overhead lines and 3.5 miles as underground lines). Using the disturbance estimates associated with work areas and travel paths, that effort could have created up to 29.4 acres of temporary disturbance. However, the distribution power-line relocation activities were almost entirely completed from adjacent existing roadways, and the use of

horizontal boring or knifing via a small plow that did not side-cast spoils temporarily disturbed approximately 0.2 acre of soil. Pole relocations resulted in 0.07 acre of permanent disturbance.

Well Relocation

NPPD will relocate four existing wells that serve livestock watering tanks and irrigation pivots along the R-Project centerline. Existing wells will be capped, and new wells will be drilled. New wells likely will be relocated approximately 150 feet from their current location to provide electrical clearance during installation and future maintenance by the landowner. A well drilling truck will be required for the installation of the relocated wells. Each well will require a 2,400-square-foot (40 x 60 feet; 0.06 acre) work area. A small-track trenching machine will be used to run a pipe from the relocated well to the livestock watering tank. Each pipe will be approximately 150 feet long. A 14-foot-wide travel path is assumed for the trenching machine to move along the pipe.

2.2 Operations and Maintenance

ROW Vegetation Management Program

NPPD has developed a Transmission Vegetation Management Program that directs operation and maintenance personnel on how to manage vegetation to ensure the safety of transmission lines. Woody vegetation will be removed before it reaches a height that would threaten the transmission line. These trees and shrubs will be removed by manual or mechanized clearing. Since the ROW is mainly grassland, little to no vegetation management will be required in the ROW.

ROW vegetation management may include the limited use of herbicides. Herbicides would be applied directly to cut tree stumps to prevent regeneration. Temporarily disturbed areas in the ROW will be restored, which may require treatment of noxious weeds in these areas with herbicides. Application of restricted-use herbicides would be approved by USFWS and NGPC and would be applied by a licensed applicator. Herbicide use is included in the Restoration Management Plan. Once the restoration goals described in the Restoration Management Plan are met, NPPD will no longer be responsible for noxious weed control as that is a responsibility of the landowner.

Transmission Line Inspection

NPPD uses helicopter, fixed-wing aircraft, drones, or ground patrols to inspect NPPD's transmission system twice per calendar year. Ground patrols are typically conducted using light ATVs or foot patrol. Inspections are conducted by transmission line technicians for line hardware, conductor and shield wire, structural steel, vegetation management encroachments, and ROW encroachments/clearance issues.

Unscheduled aerial patrols may be required during emergency or storm conditions. Under these circumstances, an NPPD employee familiar with the lines in question will accompany the aerial patrol pilot.

Routine Maintenance and Repairs

Routine scheduled maintenance and repairs will not begin until 30 years after the in-service date and will occur once every 10 years for the remainder of the life of the transmission line. Routine maintenance and repairs require a detailed inspection that involves sending personnel to each structure to check the stability of the structure and hardware associated with the transmission line. Maintenance and repairs noted during the detailed inspection can be scheduled in advance and do not require an immediate response, unlike emergency repairs.

Routine maintenance and repairs will use ATVs and light vehicles where possible. Improvements to access paths required to reach each structure will not be required for routine maintenance and repairs. Routine maintenance and repairs will be scheduled in advance to be conducted from October through April to avoid the ABB active season and, when possible, the spring and fall whooping crane migration periods to the maximum extent practicable.

Emergency Repairs

Emergency repairs include those which require a timely response by NPPD personnel to ensure the safe and efficient operation of the transmission line. Emergency repairs may be required to respond to events that remove the line from service, such as severe weather events or a broken conductor. They may also include repairs to isolated damage that is identified during annual inspections but does not take the line out of service, such as single insulators or weak points on conductors. Both types of repairs will be addressed after discovery and cannot be predicted. Repairs will be made as soon as NPPD can obtain parts and necessary equipment and ensure compliance with applicable measures in the HCP to the maximum extent practicable.

Smaller, yet essential, repairs are typically noted during the transmission line inspections described above. Equipment utilized to repair the transmission line in an emergency situation will use any means necessary to repair the line in a reasonable timeframe. Equipment may include helicopters and tracked and/or rubber-tire vehicles.

Emergency repairs may be completed at any time of the year, including the ABB active season, and may include the use of any equipment necessary to complete the repair. Any potential effects from emergency repairs would be temporary and would be restored by NPPD if conditions require restoration efforts. The majority of effects from emergency repairs, if any, will result from the need to obtain access to structures. Emergency repairs will follow the same final Access Plan identified for construction. Instances where the same access identified for construction may

not be used include stream crossings that have changed due to changes in stream course during permit duration, landowner construction of a new road or two-track that is more efficient for emergency repair access, or other changes in land use that may have occurred since construction.

While the exact location of emergency repairs cannot be predicted, NPPD can estimate the acres potentially disturbed. NPPD estimates that the acres that will be temporarily disturbed from emergency repairs will be equal to 20% of the total temporary disturbance that will occur during construction activities that have not yet been completed. This 20% estimate includes repairs to isolated damages, such as single insulators or weak points on conductors noted during annual inspection, as well as large-scale repairs following severe weather events. Data from NPPD records on lattice tower transmission lines of similar design to and in the vicinity of the R-Project were reviewed to determine the extent of past storm damage and other emergency repair needs identified during annual inspections. These records indicate that emergency repairs were required for an average of 15% of an overall line's length. The vast majority of storm damages requiring emergency repairs occurred to lines east of GGS Substation. Lines west and north of GGS Substation had minimal storm damage and required little to no emergency repairs. Storm damage maps displayed at the R-Project public meetings support this analysis. Because the R-Project is located in an area with historically lower occurrences of emergency repairs, the use of a value of 20% to account for temporary disturbances to complete emergency repairs is likely an overestimate. In addition to being located in areas less likely to be affected by major storms compared to other parts of the state, the R-Project is designed to have storm structures installed every eight to ten miles to further limit storm damage and emergency repairs. Storm structures are specifically designed to contain damage to the transmission line to one section and prevent damage from continuing down the line. The use of storm structures is another measure that will limit the amount of emergency repairs required over the life of the R-Project.

2.3 Conservation Measures

2.3.1 American burying beetle avoidance, minimization, and mitigation measures

In order to limit impacts from the Covered Activities, NPPD has committed to implement avoidance and minimization measures. These avoidance and minimization measures were designed to meet the objectives for Goal 2 of the HCP's conservation plan (Chapter 6.1 of the HCP), which is to maintain or restore ABB habitat within the permit area to support a sustainable ABB population. The identified objectives to achieve that goal are: 1) during project construction and operation, ensure permanent disturbance of ABB habitat does not exceed 20 acres from R-Project Covered Activities, 2) during Project construction, ensure temporary disturbance of ABB habitat does not exceed 1,250 acres from R-Project Covered Activities, and 3) Within five years post-construction, establish vegetation on disturbed sites with basal ground cover at least 80% of adjacent reference plots, thus restoring ABB habitat. Thirty paired disturbance and reference plots (total of 60 plots) will be established so that there is approximately one plot pair every four miles of transmission line within the permit area. The

avoidance and minimization measures are summarized below and described in Section 6.2.1 of the HCP. The Service has analyzed the effects of the proposed action based on the assumption that all of these avoidance and minimization measures will be implemented.

ABB Avoidance and Minimization Measures committed to by NPPD within their HCP include:

- **Consideration of ABB density during route selection -** NPPD considered ABB predicted probability of occurrence in Nebraska's Sandhills (Jurzenski et al. 2014) to minimize project-related ground disturbance in the highest ABB density areas.
- **Avoidance of sub-irrigated wet meadows and mesic grasslands** - ABB is a habitat generalist when foraging. However, the species requires areas with some element of moist soils (i.e., wet meadows and edges of wetlands) during periods of inactivity (Bedick et al. 2006; Panella 2013); sub-irrigated wet meadows and mesic grasslands as some of the most likely ABB habitat (USFWS 2014). Field-verified and desktop wetland inventory was used to identify construction areas that present less-favorable ABB habitat, thus the number of ABB present in areas of project-related ground disturbance is expected to be lower than if it was occurring in moist soil habitats.
- **Use of existing roads and two-tracks for access to minimize ground disturbance.**
- **Use of temporary improvements for access** – Any fill material will be removed upon completion of construction. These areas will be revegetated upon completion of construction and, upon revegetation, will provide ABB habitat, thereby reducing permanent impacts to ABB habitat.
- **Overland access with low-ground-pressure equipment** - Overland access with no improvement will be used in areas with suitable terrain to avoid soil disturbance. While overland access may result in the incidental take of ABB via crushing, it will not require improvements (blading or fill), and vehicles will drive over vegetation rather than remove it, thus retaining ABB habitat. Overland access will use existing two-tracks where available.
- **Siting temporary work areas in areas unsuitable for ABB use** – Temporary disturbances associated with Covered Activities have been located within the same footprint or will occur in areas considered unsuitable for ABB.
- **Use of helical pier foundations in Sandhills** - Helical pier foundations for lattice structures require fewer pieces of equipment, a smaller temporary structure work area, and less improved access to each structure than traditional foundations on steel monopole structures. Helical pier foundations do not require excavation, and thus the use of these structures minimizes disturbance.
- **Use of helicopters for construction** - The use of helicopters for Covered Activities will reduce the need for ground access for large construction equipment at each structure location. Helicopter flights used in the construction of power lines are covered under visual flight rules and do not require the filing of formal flight plans with the FAA. However, the helicopter pilots and construction contractor will develop an internal daily

flight plan for the preferred flight path of that day's activities. Daily flight plans will likely be developed one to two days prior to the placement of structures and are heavily dependent on local weather conditions and topographic features. The daily flight plan will follow the safest and most direct route possible between the fly yard/assembly area and structure locations.

- **Winter construction** - Covered Activities associated with identified structures including work areas, structure erection, and stringing, pulling, and tensioning will occur from December 1 through February 28. When Covered Activities are completed during this time period, effects to individual ABB will be greatly reduced because individuals will be buried to their overwinter depth beneath the frost line and protected by a layer of frozen soil. Because construction will take approximately 21 to 24 months to complete, some construction activities will be completed during the winter construction timeframe.
- **Limited nighttime construction during periods when ABB are active** - In the event nighttime construction is required, downshield, low-temperature lighting would be used. The rare nature of nighttime construction combined with the application of specified lighting will limit the likelihood of attracting ABB to active construction areas at night. With the application of this minimization measure, fewer ABB may be attracted to nighttime work, potentially reducing impacts to individual ABB.
- **Downshield, Low-Temperature Lighting –** Permanent lighting will not be required on transmission support structures within the permit area. The Thedford Substation is located within the permit area and will require limited permanent lighting for security purposes. Downshield, low temperature lighting will be installed in these instances to prevent attracting ABB to the substation and reduce impacts to individual ABBs.
- **Application of herbicides during daytime hours** - All application of herbicide treatments for noxious weeds will be completed during the daytime. This will eliminate the possibility that herbicides could be applied directly to an ABB because individuals would be underground during the herbicide application.
- **Restoration of ABB habitat will be completed in areas where temporary disturbance has occurred as described in the Restoration Management Plan** - To ensure restoration is successful, NPPD has prepared a Restoration Management Plan and has established an Escrow Account. See Appendix E and Section 6.2.2 of the HCP for a full description of the restoration efforts.
- **Worker Educational Awareness Program** - All personnel entering R-Project work areas, including contractors, will receive environmental training to emphasize compliance with all project-wide environmental requirements.

Mitigation Measures Proposed for the ABB

To mitigate impacts of taking ABB as a result of the R-Project, NPPD will protect land providing ABB habitat in perpetuity to support the ABB Sandhills population. NPPD has

assumed that all disturbed acres are ABB habitat and present equal high-quality value to ABB. Because all acres disturbed by the R-Project are assumed to be ABB habitat, all disturbance within the permit area will be mitigated at a ratio of three acres of mitigation for every one acre of disturbance (3:1). ABB habitat temporarily disturbed will be restored to its previous vegetation condition after construction is complete as described in the Restoration Management Plan. The R-Project estimates that restoration of vegetation cover will be achieved in an average of five years based on published guidance for Nebraska (Anderson 2007; Steinauer et al. 2003). This average represents 10% of the life of the Project. Following this timescale, mitigation acres for temporary construction impacts will be multiplied by 10% to mitigate for five years of ABB habitat loss. The same formula is applied to determine appropriate mitigation acres for temporary emergency repairs impacts. R-Project mitigation ratios and the resulting mitigation acres required are presented in Table 2.

Table 2. R-Project Mitigation Ratios and Resulting Mitigation Acres Required (NPPD 2025).

TYPE OF IMPACT	AFFECTED ACRES	MITIGATION RATIO (CONSERVED:AFFECTED)	TEMPORARY IMPACT TIMESCALE[1]	MITIGATION ACRES REQUIRED
Temporary construction impact	1,249.5	3:1	10%	374.9
Permanent impact	19.86	3:1	--	59.58
Temporary emergency repairs impact[2]	250	3:1	10%	75
TOTAL	**--**	**--**	**--**	**509.83**

[1]Five years or 10% of the Project life.
[2]250 acres represents 20% of the construction subtotal within the Permit Area.

NPPD has purchased 594 acres of mitigation lands that include portions of Sections 15 and 22 in T24N, R22W in Blaine County, Nebraska. This parcel is a continuous tract of land that has documented ABB presence along the entire tract. NPPD has completed five years of ABB surveys along public roads adjacent to these mitigation lands. ABB densities on portions of the property are within the upper 10% of densities documented in the USFWS ABB database. NPPD, in conjunction with the USFWS and NGPC, has developed a management plan for the mitigation parcel that addresses land uses, such as grazing, haying, controlled burning, etc., that will be utilized to maximize ABB density on the parcel. NPPD will implement this plan and maintain the property in its current grassland land cover that provides habitat for ABB in perpetuity. This mitigation parcel management plan is provided in Appendix F of the HCP.

In addition to these mitigation lands, NPPD will restore temporarily disturbed ABB habitat in the R-Project permit area to its previous vegetation condition after construction is complete; in conducting this restoration, they will follow the procedures described in the R-Project Restoration Management Plan. The goal of the Restoration Management Plan is to meet the restoration success criteria for the restoration of ABB habitat within five years post-construction.

To ensure restoration is successful, NPPD has established an escrow account with a banking association to serve as a financial guarantee that there is money available to restore temporary disturbance areas if NPPD fails to take the appropriate steps to do so. The funds in the Escrow Account will not be disbursed if NPPD is actively implementing restoration activities including adaptive management. If performance standards are not met as described in the HCP, NPPD will implement adaptive management measures until restoration success is achieved. Under the adaptive management framework described in the HCP, at no point would NPPD cease restoration efforts should their initial attempts fail. NPPD has completed a Restoration Management Plan that details the restoration methods, monitoring, and success criteria to provide information to the banking association escrow agent on the requirements for NPPD to restore temporary disturbance areas. As lands are successfully restored as described under the Performance and Success Criteria, NPPD and USFWS will agree upon the percent of the funds in the Escrow Account that can be returned to NPPD.

As noted in Section 2.1 and 2.2 above, NPPD completed activities under ITP #TE72710C-0 in 2019 and 2020, including the foundation work on the Thedford Substation, and portions of necessary tree clearing, distribution line moves, and establishment of material delivery yards and fly yards, for which mitigation acres was secured by the purchase of the above mitigation lands and restoration was completed as necessary.

2.3.2 Whooping crane avoidance and minimization measures

The following conservation measures will be implemented by NPPD with the intent to avoid and minimize adverse effects to the whooping crane resulting from the proposed action.

The conservation measures proposed for whooping cranes are:

- With the exception of emergency outages, the NPPD will replace lines and structures, and perform maintenance within 1- mile of suitable roosting habitat outside of the whooping crane migratory seasons. Currently the dates for maintenance are April 30 – October 8, and November 16 – March 5, but will be adjusted at the time of replacement or maintenance). As many of the lines will last 30 plus years before needing to be upgraded or replaced, the timing of migration and the maintenance period may need to be adjusted. If the NPPD observes missing or ineffective diverters during their routine line inspections, they will be considered emergency maintenance and have them replaced regardless of migration season.
- Any emergency repairs required during the whooping crane migration period will be preceded by a whooping crane presence/absence survey that will meet or exceed the standard agency protocol in place at the time of the repair.
- For helicopter activities during construction, NPPD has committed to avoiding sensitive features in the daily flight plan which may include, but are not limited to, occupied

homes, businesses, concentrations of cattle, active bald eagle nests, and large concentrations of waterfowl or cranes.

- Daily whooping crane surveys will be completed according to the most current protocol prior to the initiation of all construction activities during migration periods for habitat within 0.5-mile of construction activities. The USFWS and NGPC's current protocol includes revised spring (March 6 – April 29) and fall (October 9 – November 15) whooping crane migration periods.
    - *Morning surveys:* Surveys will occur in the morning prior to the initiation of construction activities that day. If a whooping crane is observed within 0.5- mile of any construction-related activity, work would not be allowed to begin until the whooping crane vacates the area of its own accord and NGPC and USFWS will be contacted immediately. If no whooping crane is observed within 0.5-mile, work will commence at that location.
    - *Other observations:* If, during the day, a whooping crane lands within 0.5-mile, all work will cease and will not resume until the whooping crane(s) has left the area or relocated at least 0.5-mile away from the construction area on its own accord. If a whooping crane is observed in the vicinity of but more than 0.5-mile away from the construction area, that bird will be observed for signs of agitation. If signs of agitation are observed, all construction activities will cease until the individual has relocated on its own accord.
    - *Monitoring:* Environmental monitors will be required to maintain documentation of daily whooping crane surveys and occurrence of whooping cranes within 0.5 mile. Checklists will be completed by the environmental monitors and submitted to NPPD. NPPD will submit a summary of all whooping crane survey checklists to the USFWS and NGPC at the completion of each whooping crane migration season. NPPD will maintain copies of all checklists and can provide the USFWS or NGPC with copies upon request.
- Line marking devices will be installed on the overhead shield wire along all 226 miles of the R- Project, including river channels and wetlands, as identified in the desktop habitat assessment. Marking will be done in accordance with NPPD construction standards and APLIC Guidelines (APLIC 2012).
    - Areas with known high avian densities, such as river crossings and known roost sites, will be marked with avian flight diverters with reflective and glow-in-the-dark surfaces.
    - Line marking devices will be installed on 124 miles of NPPD-owned power lines within the 95% sighting migration corridor to comply with the Region 6 Guidance. Selection of existing lines to be marked is described above and will be completed in cooperation with the USFWS and NGPC.

  - These segments were identified as high-risk areas for whooping crane collisions due to their proximity to suitable habitat and known migratory pathways. The diverter installation is intended to reduce the likelihood of collision along both new and existing infrastructure within the whooping crane migratory corridor, in accordance with APLIC guidelines (APLIC 2012) and in support of ESA Section 7 consultation objectives.

- All personnel including contractors will be required to complete the Worker Environmental Awareness Program regarding ESA-protected species as described in Section 6.2.1.
- Temporary and permanent disturbance areas, such as construction yards/staging areas, fly yards/assembly areas, structure work areas, temporary access, and structure locations were sited to avoid potentially suitable whooping crane habitat to the maximum extent practicable. Further refinement of the siting of these work areas will be conducted in the field during final design.
- Wetland habitat will be crossed using specialized equipment, temporary matting, or other best management practices (BMPs).
- Temporary disturbance to potentially suitable whooping crane stopover habitat would be restored as per the Restoration Management Plan.
- The R-Project transmission line will span rivers and streams at locations with existing bridge crossings where such infrastructure is available.
- NPPD has committed to acquisition, protection, and management of 594 acres of suitable habitat for the incidental take permit's covered species (American burying beetle). This habitat also constitutes highly suitable whooping crane habitat with recent documented phase 2 telemetry records by multiple whooping cranes.

2.3.3 Monarch and Western regal fritillary avoidance and minimization measures

NPPD has not proposed any specific conservation measures for the monarch or western regal fritillary. However, the species can benefit from some of the measures proposed for the American burying beetle described in Section 2.3.1 above, such as:

- Helicopter use for erecting lattice structures, stringing sock line, and mobilizing certain equipment.
- Use of helical pier foundations in Sandhills with no existing access to reduce disturbance.
- Use of existing access roads, including two-tracks to the extent practicable.
- Conducting certain construction activities in winter (December 1 through February 28) in specified areas (see Section 2.3.1).
- Siting of disturbance areas on previously disturbed lands or unsuitable habitat to the extent practicable.

- Best management practices to control erosion and sediment runoff from construction areas.
- Worker Environmental Awareness Program.
- Restoration of habitat following temporary disturbance.
- NPPD has committed to acquisition, protection, and management of 594 acres of suitable habitat for the incidental take permit's covered species (American burying beetle). Given the location of the mitigation land in high quality grassland, it likely contains habitat for monarch and western regal fritillary.

2.4 Changed Circumstances

Changed circumstances as defined by 50 C.F.R. § 17.3 are those changes in circumstances affecting a species or geographic area covered by an HCP that can reasonably be anticipated by the plan's developers and the Service for which responses can be planned for (e.g., the listing of new species, effects of climate change, or a fire or other natural catastrophic event in areas prone to those events). If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances, and such measures were not provided for in the HCP, the Service will not require those additional measures, provided that the commitments and provisions of the HCP have been or are fully implemented. NPPD may elect to implement additional voluntary conservation measures. NPPD has identified seven types of changed circumstances:

2.4.1 The Service delists a Covered Species.

Should a Covered Species be delisted during the term of the ITP, it is expected that the mitigation measures and associated funding provided for in this HCP would have contributed in some part to the delisting of the species. The mitigation agreed to in this HCP would continue to benefit the species after a potential delisting, because the mitigation is provided in perpetuity. However, delisting of a Covered Species would remove the potential for incidental take from Emergency Repair activities and such activities would no longer be subject to avoidance and minimization measures described in this HCP. NPPD could choose to relinquish the ITP or to continue to implement the HCP as agreed upon. Even if it decides to relinquish the ITP, NPPD would continue restoration activities until all restoration goals are met.

2.4.2 The Service lists a species occurring in the Study Area.

In the event that a non-covered species that may be affected by Covered Activities becomes listed under the ESA, the permittee will implement avoidance measures identified by the USFWS until the permit is amended to include such species or until the USFWS notifies the permittee that such measures are no longer needed to avoid jeopardy to, take of, or adverse modification of the critical habitat of the non-covered species.

2.4.3 Natural/anthropogenic disasters alter the habitat of ABB.

Natural and anthropogenic disasters have potential to alter the status of listed species. Consequently, this could alter the relative importance of the incidental take of individuals. Such disasters could result in loss of habitat or in decreased suitability of available habitat.

- Drought – One area of concern is the effect of drought during restoration efforts following construction. Prolonged drought in the Sandhills can lead to localized decreases in ABB populations where soil moisture declines. Prolonged drought can also slow the establishment of vegetation following restoration efforts. In the event that drought decreases the success rate of restoration efforts, NPPD will continue those efforts under the Adaptive Management framework described in Section 6.5 and in the Restoration Management Plan. At no point would NPPD cease restoration efforts.
- Wildfire – It is possible that construction, operation, and maintenance activities could ignite a wildfire through contact between dry vegetation and hot vehicle components or as a result of stray sparks from welding and cutting torches. NPPD will have fire suppression tools, including water trucks or air-lifted water tanks, at every construction location with potential for fire ignition. Fire would have a greater likelihood of igniting during periods of prolonged drought. A wildfire could also occur as a result of natural or other anthropogenic causes. Wildfire would temporarily remove ABB habitat throughout burned areas, making refugia areas such as the lands protected by R-Project mitigation all the more important. In the event of a wildfire occurring after habitat restoration has met the necessary success criteria, NPPD will allow vegetation to naturally regenerate. In the event of a wildfire occurring before restoration efforts have met the necessary success criteria, NPPD will continue restoration efforts under the Adaptive Management framework described in Section 6.5 and in the Restoration Management Plan.
- Severe storms – Severe thunderstorms are common in central Nebraska during the spring and early summer and are not expected to largely influence ABB populations; however, they can cause erosion and sediment runoff from areas undergoing restoration efforts. In the event of severe storms occurring before restoration success criteria have been met, NPPD will continue restoration efforts under the Adaptive Management framework described in Section 6.5 and the Restoration Management Plan. Restoration areas that suffer damaging erosion as an effect of severe storms will be treated with erosion control measures as described in the Restoration Management Plan.

2.4.4 Effects of global climate change substantially alter status of ABB.

Global climate change within the life of the ITP (50 years) conceptually has potential to affect ABB through region-wide changes in weather patterns, average temperature, and levels of

precipitation affecting the species or their habitats (Intergovernmental Panel on Climate Change 2007). Potential effects to ABB as a result of climate change were discussed at length in the SSA (USFWS 2019a). Effects of anthropogenic or natural disasters that are exacerbated by global climate change will be addressed as described above.

Overall, if changes substantially affecting ABB occur as a result of global climate change, NPPD will coordinate with USFWS and NGPC to determine if changes to operation of the HCP and/or mitigation areas are warranted. Any changes will be performed to meet objectives of the HCP. Changes to the operation of the HCP or mitigation areas will not result in the additional commitment of land, water, or financial compensation without NPPD's consent.

2.4.5 Empirical data indicate Covered Activities do not result in incidental take of a Covered Species or result in a significantly different level of incidental take than that anticipated in the HCP.

Should survey or monitoring results completed by NPPD after the issuance of the ITP indicate ABB is not being incidentally taken or is being taken at levels different than that anticipated by this HCP, NPPD will consult with USFWS and NGPC to determine if changes to the Project operation conditions in the HCP are warranted, and if necessary, to seek an amendment to the ITP.

2.4.6 Empirical data indicate the range of ABB extends to disturbance areas outside the permit area and results in a significantly different level of incidental take than the calculated take in the HCP.

Should ABB surveys completed by NPPD or other biologists after the issuance of the ITP indicate ABB presence within the project area but outside of the permit area, then NPPD will implement take-avoidance measures in those areas. If implementation of such take-avoidance areas is infeasible, NPPD will coordinate with USFWS to revise the HCP and seek an amendment to the ITP.

2.4.7 Emergency repairs result in the disturbance of ABB habitat and take of ABB beyond that estimated as Covered Activities.

If the rate at which habitat is disturbed by emergency repairs begins to suggest that the future need for these types of disturbances will exceed 250 acres within the permit area, NPPD will coordinate with the USFWS and NGPC to determine if the ITP should be amended and NPPD should implement additional mitigation based on methodologies described in Section 6.2.2 of this HCP. NPPD has purchased 594 acres of mitigation, which is more than is required to offset anticipated disturbance. USFWS and NGPC would examine whether the excess mitigation would sufficiently offset any additional impact of take from repair activities that may exceed the amount in the ITP in the future.

2.5 Monitoring and Reporting

2.5.1 Monitoring and Adaptive Management Measures

The HCP describes the following compliance and effectiveness monitoring requirements in Sections 6.3.1 and 6.3.2:

- Annual ABB population monitoring will be conducted each August at the same 79 trap locations (discussed below) originally established for the August 2016 survey. Surveys will be completed each August until the completion of construction activities.
- There will be on-site compliance monitors to ensure that avoidance and minimization measures, such as the use of low-ground-pressure equipment and the avoidance of sensitive environmental areas, are followed during construction activities.
- Compliance monitors will ensure that environmentally sensitive areas (e.g., special-status species habitat) are flagged and that it is clear to crews that designated construction boundaries are adhered to.
- Areas representing the limits of potential disturbance areas will be identified and flagged prior to the onset of Covered Activities. Compliance monitors will ensure that disturbance boundaries are not violated by construction personnel and that the total disturbance to ABB habitat associated with Covered Activities will not surpass the permit take authorization.
- Compliance monitors will quantify acres of disturbance located in areas unsuitable for ABB use to report to the USFWS.
- NPPD will design a final Access Plan for the R-Project that delineates where construction areas will be accessed. Environmental compliance monitors will ensure that the Access Plan is followed by construction personnel.
- Compliance monitors will document results of monitoring to NPPD each month using a compliance checklist.
- Effectiveness monitoring will be implemented to evaluate post-construction restoration effectiveness and to inform the adaptive management program where additional restoration is needed. Effectiveness monitoring will include visual assessment and photographs where soil disturbance has occurred, along with sampling basal cover at 30 paired disturbance and reference plots (total of 60 plots).
  Effectiveness monitoring will be conducted during late summer for five consecutive years following restoration unless restoration objectives are met earlier.

Sections 6.5.1 and 6.5.2 of the HCP describes the Adaptive Management that will be used for restoration of habitat and on the mitigation parcel, including 1) Identifying areas of uncertainty and questions that need to be addressed to resolve the uncertainty; 2) Developing alternative management strategies and determining which experimental strategies to

Implement, 3) Integrating a monitoring program that is able to acquire the necessary information for effective strategy evaluation, and 4) Incorporating feedback loops that link implementation and monitoring to a decision-making process that results in appropriate changes in management.

2.5.2 Reporting

NPPD will submit an annual report to the Service by March 31 of each year during the life of the ITP. Annual reports will include:

• Brief summary or list of Covered Activities accomplished during the reporting year, including construction activities and operations and maintenance activities.

• Temporary and permanent construction disturbance impacts (i.e., number of acres disturbed by Covered Activities) incurred that year.

• Description of potential ABB take that occurred based on disturbances incurred that year. If take authorized by the ITP is exceeded, Service and NGPC will be notified immediately.

• Brief description of conservation plan implementation, including avoidance and minimization measures implemented.

• Compliance and Effectiveness monitoring results.

• Description of circumstances that made adaptive management necessary and how it was implemented, if applicable.

• Description of any changed or unforeseen circumstances that occurred and what was done to deal with those circumstances.

• Funding expenditures, balance, and accrual.

• Description of any permit amendments.

2.6 Other Activities Caused by the Action

A BO/CO evaluates all consequences to species or critical habitat caused by the proposed Federal action, including the consequences of other activities caused by the proposed action, that are reasonably certain to occur (see definition of "effects of the action" at 50 CFR §402.02).

2.6.1 Related Renewable Energy

Renewable energy projects are anticipated to connect to the R-Project transmission line and are therefore considered as "activities that are caused by the proposed action but are not part of the action" in this consultation. Consequences from these activities are evaluated if they would not occur but for the proposed action and are reasonably certain to occur (50 CFR 402.02).

To determine which renewable energy projects are "caused by" the proposed action (related renewable energy), the Service reviewed information from the Southwest Power Pool (SPP), the Regional Transmission Organization that approves any proposed renewable energy projects connecting to the electric grid within the action area. Approximately 80% of the renewable energy project requests in SPP's three-phase decision process drop out before signing a generator interconnection agreement (NPPD 2023). Therefore, the Service has determined renewable energy projects are only reasonably certain and related to the R-Project if: 1) the project is identified in the SPP study as connecting to the R-Project or contingent on the R-Project, and 2) the project been approved through SPP's third study phase. The renewable energy projects that are considered reasonably certain and related to the R-Project are listed in Table 3 below. The Service is not aware of specific location information of any distribution or transmission lines associated with the related renewable energy projects (i.e., lines specific to the renewable energy project to provide connection to the larger electric grid) and therefore cannot analyze any potential effects to any species from this infrastructure.

Within the effects of the action sections of this BO/CO, we evaluate effects from the related renewable energy projects that 1) are within the species range and 2) we have the appropriate detail of information available to determine that effects are reasonably certain for a particular species:

1) *American burying beetle, monarch butterfly, and western regal fritillary*: To evaluate whether effects are reasonably certain to occur from the related renewable energy projects, the Service needs specific locations of the wind turbines or solar infrastructure footprints. This information is necessary to determine whether any ABB, monarch, or western regal fritillary habitat would be affected.
2) *Whooping crane*: To evaluate whether effects to the whooping crane are reasonably certain to occur from wind energy projects, the Service needs the general project boundary to determine potential migration airspace and roosting habitat. For solar energy projects, the Service needs the specific solar infrastructure footprint to determine whether whooping crane roosting habitat is affected.

Conclusions on the specific renewable projects that are related to the R-Project and whether the known project information results in reasonably certain effects to the ABB, whooping crane, monarch, and western regal fritillary are shown in Table 3 below. If effects are reasonably certain, the area affected is included as part of the action area (section 2.6, *Action Area*).

Table 3. Renewable projects connecting to or contingent upon the R-Project, as of September 2025, that have been approved through SPP's third study phase (project information from ICF 2026, Table 3.1-3, p. 3.1-6).

Project Name	Project Type (wind/ solar)	Project activity (construction & operation or only operation)	Project County	Potential Project Info	Is the project boundary known? (yes/no)	Are the exact locations of turbine/ solar infrastructure known? (yes/no)	Are effects to American burying beetle reasonably certain based on known project information? (yes/no)	Are effects to whooping crane reasonably certain based on known project information (yes/no)?	Are effects to monarch butterfly reasonably certain based on known project information (yes/no)?	Are effects to western regal fritillary reasonably certain based on known project information (yes/no)?
Big Blue Nebraska	Wind	Construction and Operation	Jefferson and Saline	300 MW; 150 turbines	yes	no	no; infrastructure locations not known	no; not in whooping crane range	no; infrastructure locations not known	no; infrastructure locations not known
Blue Prairie	Wind	Construction and Operation	Saline	128 MW; 64 turbines	no	no	no; infrastructure locations not known	no; not in whooping crane range	no; infrastructure locations not known	no; infrastructure locations not known
Greeley Wind Nebraska	Wind	Construction and Operation	Greeley	115 MW; 46 turbines	yes	no	no; infrastructure locations not known	**yes**; within whooping crane corridor; project boundary known	no; infrastructure locations not known	no; infrastructure locations not known
Prairie Hills Wind	Wind	Construction and Operation	Custer	200 MW; 100 turbines	yes	no	no; infrastructure locations not known	**yes**; within whooping crane corridor; project boundary known	no; infrastructure locations not known	no; infrastructure locations not known

Project Name	Project Type (wind/ solar)	Project activity (construction & operation or only operation)	Project County	Potential Project Info	Is the project boundary known? (yes/no)	Are the exact locations of turbine/ solar infrastructure known? (yes/no)	Are effects to American burying beetle reasonably certain based on known project information? (yes/no)	Are effects to whooping crane reasonably certain based on known project information (yes/no)?	Are effects to monarch butterfly reasonably certain based on known project information (yes/no)?	Are effects to western regal fritillary reasonably certain based on known project information (yes/no)?
Steeple Wind Energy	Wind	Construction and Operation	Holt, Antelope, Wheeler	200 MW; 80 turbines	yes	no	no; infrastructure locations not known	**yes**; within whooping crane corridor; project boundary known	no; infrastructure locations not known	no; infrastructure locations not known
Thunder-head Wind Energy	Wind	Permanent Increase in Generation Only	Antelope, Wheeler, Holt	300 MW; 108 turbines	yes	yes	no, effects from increased generation not reasonably certain	no, effects from increased generation not reasonably certain	no, effects from increased generation not reasonably certain	no, effects from increased generation not reasonably certain
Uncertain Wind Project	Wind	Construction and Operation	Holt	50 MW; unknown turbines	no	no	no; infrastructure locations not known	no; project boundary not known	no; infrastructure locations not known	no; infrastructure locations not known
K-Junction Solar	Solar	Construction and Operation	York	310 MW; 2,800 acres	no	no	no; infrastructure locations not known	no; project boundary and infrastructur e locations not known	no; infrastructure locations not known	no; infrastructure locations not known

Project Name	Project Type (wind/ solar)	Project activity (construction & operation or only operation)	Project County	Potential Project Info	Is the project boundary known? (yes/no)	Are the exact locations of turbine/ solar infrastructure known? (yes/no)	Are effects to American burying beetle reasonably certain based on known project information? (yes/no)	Are effects to whooping crane reasonably certain based on known project information (yes/no)?	Are effects to monarch butterfly reasonably certain based on known project information (yes/no)?	Are effects to western regal fritillary reasonably certain based on known project information (yes/no)?
Sidney Solar	Solar	Construction and Operation	Cheyenne	40 MW; 320 acres	no	no	no; infrastructure locations not known	no; not in whooping crane corridor	no; infrastructure locations not known	no; infrastructure locations not known

2.7 Action Area

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR §402.02). Delineating the action area is necessary for the Federal action agency to obtain a list of species and critical habitats that may occur in that area, which necessarily precedes any subsequent analyses of the effects of the action to particular species or critical habitats.

It is practical to treat the action area for a proposed Federal action as the spatial extent of its direct and indirect "modifications to the land, water, or air" (a key phrase from the definition of "action" at 50 CFR §402.02). Indirect modifications include those caused by other activities that would not occur but for the action under consultation. The action area determines any overlap with critical habitat and the physical and biological features therein that we defined as essential to the species' conservation in the designation final rule. For species, the action area establishes the bounds for an analysis of individuals' exposure to action-caused changes, but the subsequent consequences of such exposure to those individuals are not necessarily limited to the action area. Figures 1, 2, and 3 show the locations of all activities that the proposed Action would cause and the spatial extent of reasonably certain changes to land, water, or air caused by these activities, based on the descriptions and analyses of these activities in sections 2.1–2.6.

To ensure clarity to the consideration of changed resources, the Service treats the Action Areas radii as extending vertically to account for changes to airspace (e.g., placement of structures in previous unobstructed airspace), which is an essential resource for flighted species with aerial movements required to complete their full life history cycle.

2.7.1 Area of Effects for American Burying Beetle

Effects to the American burying beetle are anticipated within the permit area for the R-Project, as described in the HCP (NPPD 2025) and shown below in Figure 1:

> The permit area for this HCP is defined as the geographical area within which incidental take resulting from Covered Activities is expected to occur. The permit area begins where the R-Project crosses Nebraska Highway 92 at the town of Stapleton, Nebraska and continues north to the Thedford Substation and then east to the Holt County Substation. A distribution model for ABB in Nebraska's Sandhills was developed by Jurzenski et al. (2014) and updated by Jorgensen et al. (2014). The model was developed using a logistic regression model for presence/absence data and a number of climates, soil texture, and landcover variables. The updated Jorgensen et al. (2014) publication, which included authors from the USFWS and NGPC, considers ABB to be present in all areas with a greater than 1.0% probability of occurrence to reduce the likelihood an area is erroneously classified as unoccupied. The 1.0% probability of occurrence begins at

approximately Stapleton. The R-Project does cross areas with greater than 1.0% probability of occurrence in northern Lincoln County; however, this was not included in the permit area following consultation with the USFWS because ABB have never been captured in northern Lincoln County. The permit area from Stapleton to the Thedford Substation includes one mile on either side of the R-Project centerline (two miles wide total). The permit area from the Thedford Substation to the Holt County Substation includes four miles on either side of the R-Project centerline (eight miles wide total).

The varying permit area width incorporates all potential impacts occurring outside the transmission line ROW including construction access and construction yards. The permit area is narrow between Stapleton and the Thedford Substation because the R-Project largely follows United States (U.S.) Highway 83 along this segment and all temporary disturbances will be within one mile of the transmission line. This includes those portions of the route between Stapleton and the Thedford Substation where the R-Project is not adjacent to U.S. Highway 83. Conversely, from the Thedford Substation to the Holt County Substation, existing access is limited, and the permit area must be wider to encompass all construction access. The permit area does not include or extend east beyond the Holt County Substation because the R-Project terminates at the substation and no disturbance will occur to the east of it. The Holt County Substation site is excluded from the permit area because it is an agricultural field that is unsuitable for ABB and because, as described in Section 1.2.1 [of the HCP], the construction of the Holt County Substation, aside from installation of line bay terminal equipment within the footprint of the substation, is no longer part of the R-Project.

The Service has determined that effects beyond the permit area from the proposed action are not reasonably certain to occur:

- The southwest segment of the transmission line route, between the NPPD Gerald Gentleman Station and Stapleton and adjacent to U.S. Highway 83, is not anticipated to have effects on the ABB due to species absence in that area.
- The permit area for the segment of the transmission line route from Stapleton to Thedford Substation includes one mile on either side of the R-Project centerline (two miles wide total), based on the location of project activities; all construction access and yards will occur within one mile of the transmission line route in this area. Therefore, effects to ABB are not reasonably certain to occur outside this permit area for this segment of the transmission line route.
- The permit area for the segment of the transmission line route from Thedford Substation to the Holt County Substation includes four miles on either side of the R-Project centerline (eight miles wide total): all construction access and yards will occur within four miles of the transmission line route in this area. Therefore, effects to ABB are not

reasonably certain to occur outside this permit area for this segment of the transmission line route.

As described in section 2.6.1 and Table 3, Related Renewable Energy, effects to the ABB from related renewable energy projects are not reasonably certain, due to the lack of specific information on wind turbine and solar infrastructure locations.

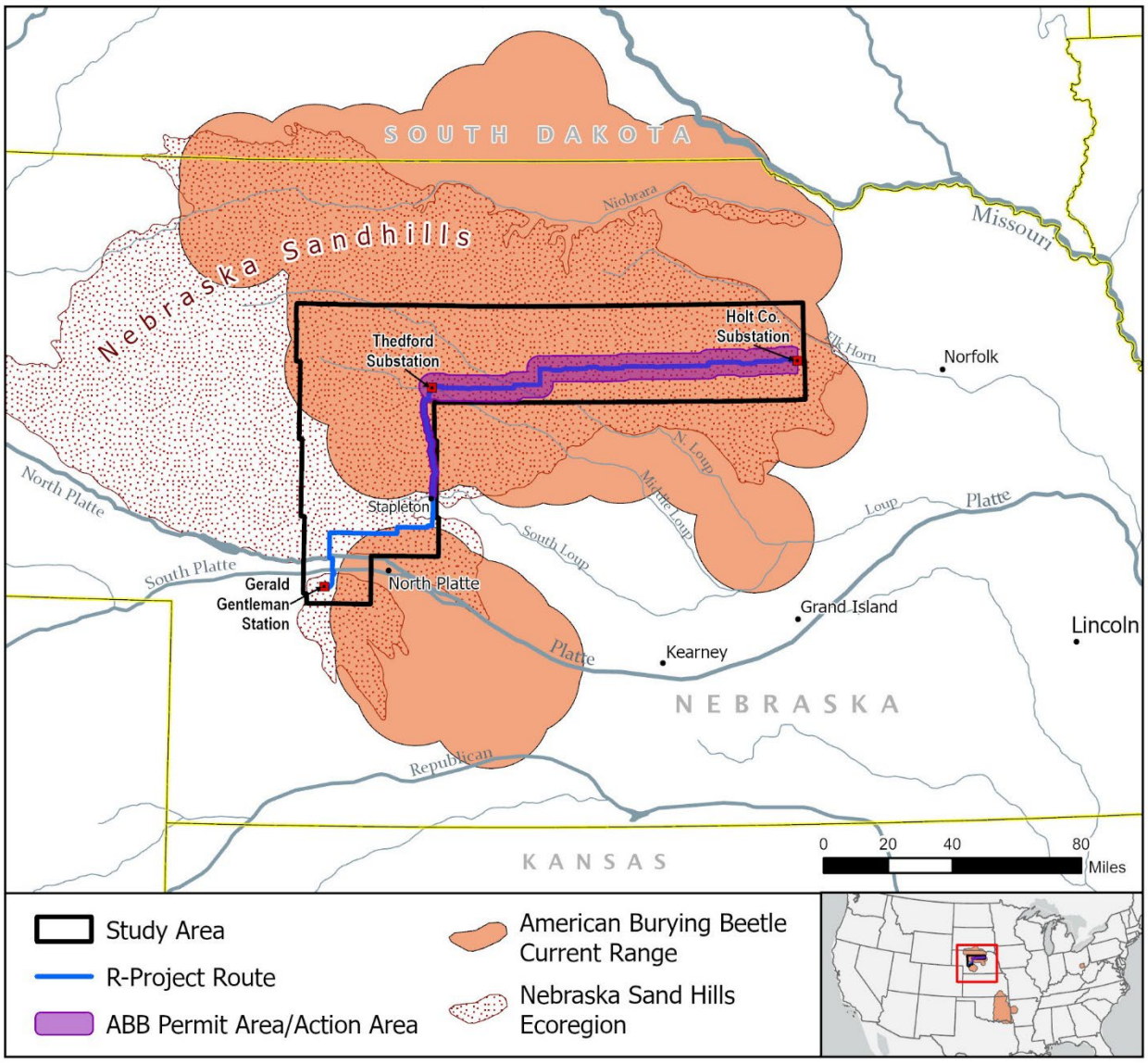

Figure 1. Action Area for American burying beetle.

2.7.2 Area of Effects for Whooping Crane

NPPD has indicated areas for construction access and construction yards (i.e., temporary work areas, staging sites, fly yards, or other areas of temporary disturbance associated with project construction and maintenance) may occur within these areas (Figure 2):

- *R-Project Segment south of Stapleton to the Thedford Substation (Highway 83 segment):* Because this segment of the R-Project follows U.S. Highway 83, all construction access and yards will occur within one mile of the transmission line.
- *All other portions of the R-Project outside of the Highway 83 segment (non-Highway 83 portion):* all construction access and yards will occur within 4 miles of the R-Project.

For whooping cranes, effects from construction may occur and within 1-mile buffer of the Highway 83 Segment and within the 4-mile buffer of the non-Highway 83 portion of the R-Project, as all activities are proposed within the whooping crane migration corridor. Construction activities and associated human disturbance is anticipated within this 1-mile and 4-mile buffer, respectively; disturbance from these types of activities and human presence are known to result in whooping cranes avoiding otherwise suitable habitat or being disturbed to an extent where they flush or abandon habitat within this area if they are present, potentially resulting in adverse effects (see Section 5.3 below). Once constructed, effects from the R-Project to whooping cranes are anticipated to occur within 1.24 miles of the entire proposed route (2.48 miles wide total), as whooping cranes are known to avoid suitable stopover habitat within 1.24 miles (2-km) of transmission line infrastructure (Pearse et al. 2021, Ellis et al. 2022, Section 5.1.4, *Threats and Conservation Needs* for whooping crane).

Additionally, effects from proposed wind projects with known project boundaries (section 2.6, *Other Activities Caused by the Action*, and Table 3) may occur within a 3.1 mile (5-km) buffer of the wind project area, as whooping cranes are known to avoid suitable stopover habitat within 3.1 miles of wind turbines (Pearse et al. 2021, Ellis et al. 2022, section 5.1.4, *Threats and Conservation Needs* for whooping crane).

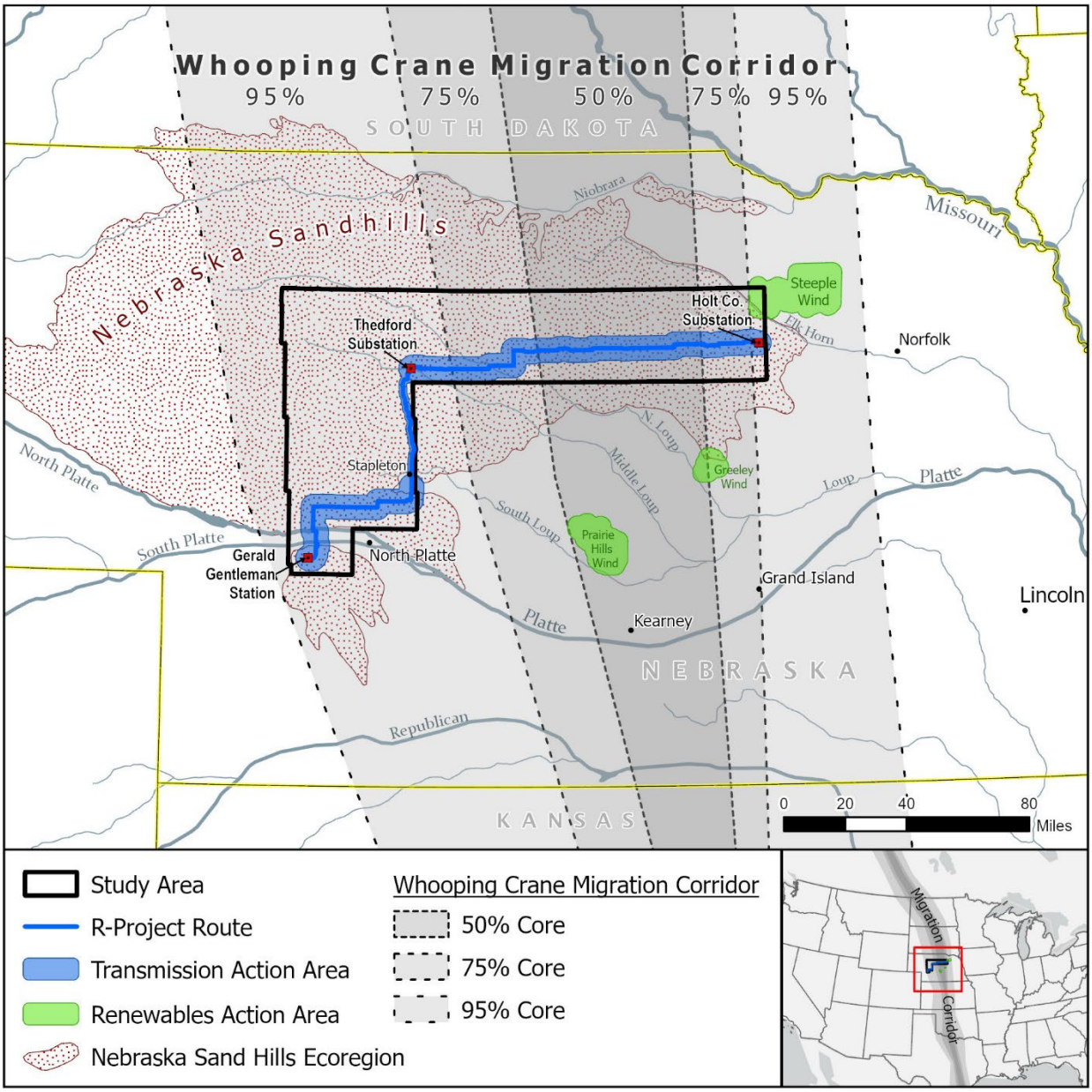

Figure 2. Action Area for Whooping Crane

2.7.3 Area of Effects for Monarch and Western Regal Fritillary

NPPD has indicated areas for construction access and construction yards (i.e., temporary work areas, staging sites, fly yards, or other areas of temporary disturbance associated with project construction and maintenance) may occur within these areas (Figure 3):

- *R-Project Segment south of Stapleton to the Thedford Substation (Highway 83 segment):* Because this segment of the R-Project follows U.S. Highway 83, all construction access and yards will occur within one mile of the transmission line.

- *All other portions of the R-Project outside of the Highway 83 segment (non-Highway 83 portion):* all construction access and yards will occur within 4 miles of the R-Project.

For the monarch and western regal fritillary, effects may occur within 1-mile buffer of the Highway 83 Segment and within the 4-mile buffer of the non-Highway 83 portion of the R-Project, as all activities are proposed within the ranges of both species.

As described in section 2.6.1 and Table 3, Related Renewable Energy, effects to the monarch and western regal fritillary from related renewable energy projects are not reasonably certain, due to the lack of specific information on wind turbine and solar infrastructure locations.

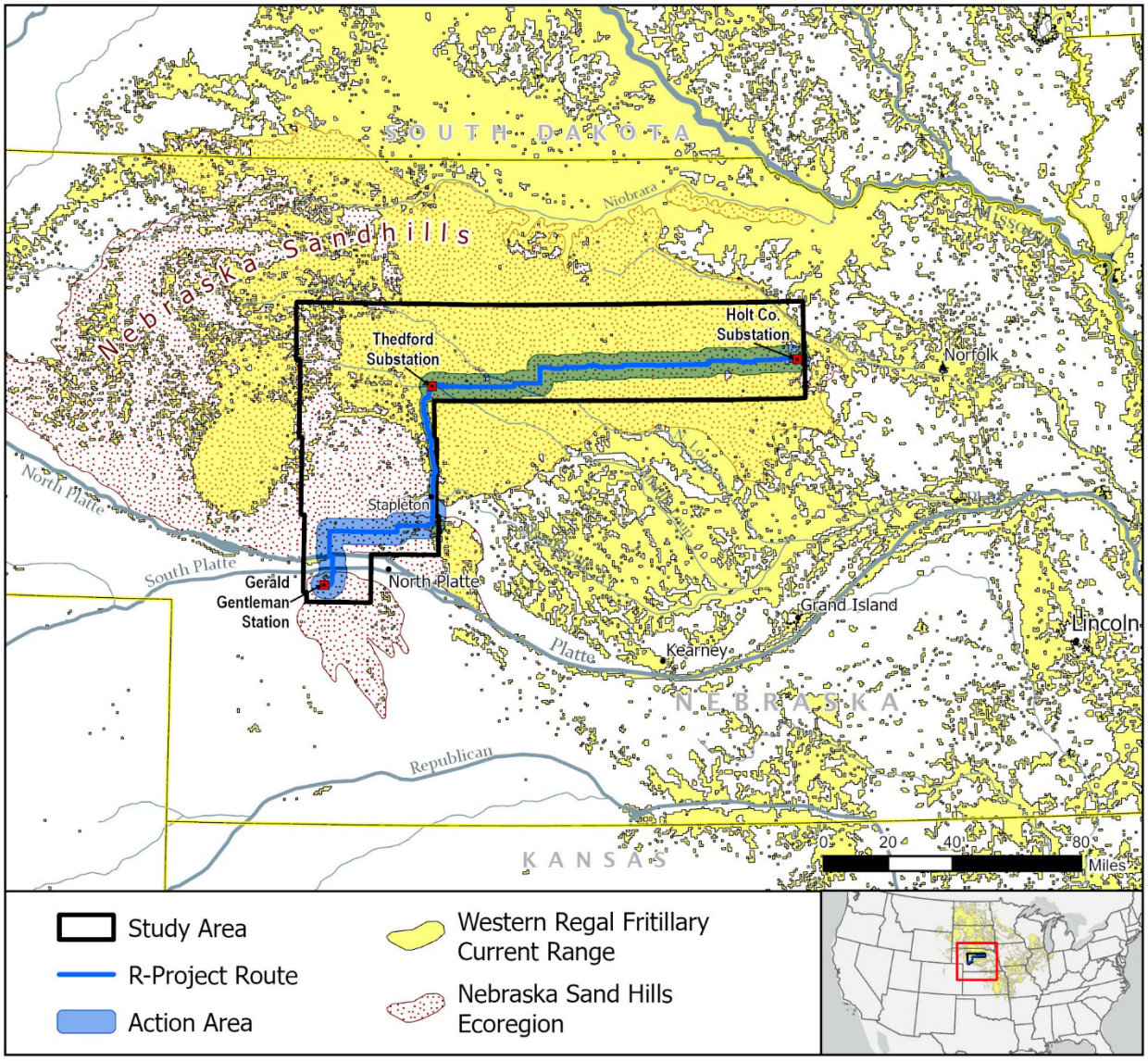

Figure 3. Action Area for Western Regal Fritillary and Monarch. The species range for Monarch encompasses the entirety of the continental United States; therefore, not shown on the figure.

2.7.4 Overall Action Area

The action area for the proposed action is shown in Figures 1, 2, and 3. It includes the entirety of area of effects for the American burying beetle, whooping crane, monarch, and western regal fritillary described above.

3. Sources of Cumulative Effects

A BO/CO must predict the consequences to species caused by future non-Federal activities within the action area, *i.e.,* cumulative effects. "Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 CFR §402.02).

At this time, the Service is not aware of any future non-Federal activities that are reasonably certain to occur within the Action Area. Therefore, we anticipate no cumulative effects that we must consider in formulating our opinion for the Action.

4. American Burying Beetle

This section provides the Service's biological opinion of the Action for the American Burying Beetle.

4.1 Status of the American Burying Beetle

This section summarizes best available data about the biology and condition of the ABB throughout its range that are relevant to formulating an opinion about the Action. The Service published its decision to list the ABB as endangered on July 13, 1989, (54 FR 29652; USFWS 1989) based on a drastic decline and extirpation over nearly its entire range. The Service prepared a recovery plan in 1991 (USFWS 1991) and a Species Status Assessment (SSA) Report in 2019 (USFWS 2019). The SSA Report on the ABB is an in-depth review of the species biology and threats, an evaluation of its biological status, and an assessment of the resources and conditions needed to maintain long-term viability. On May 3, 2019, the Service published a proposed rule and 12-month petition finding to reclassify the ABB from endangered to threatened with a 4(d) rule (84 FR 19013). The rule became effective on November 16, 2020. The Service has not designated critical habitat for this species.

When the ABB was downlisted to threatened, the Service also published a final 4(d) rule describing prohibited and nonprohibited take and exceptions to prohibited take of ABB. Activities that would result in prohibited take from soil disturbance in ABB Northern Plains Analysis Area (NPAA) are required to seek incidental take authorization from the Service under ESA Section 7 or Section 10 (50 CFR 17.47(d)). Soil disturbance is defined in the 4(d) rule as "…movement or alteration of soil. Soil disturbance includes actions such as grading, filling, soil

excavating, or topsoil stripping. Soil disturbance also includes non-physical alterations such as chemical treatment" (50 CFR 17.47(d)(3)(v)).

4.1.1 Species Description

The ABB is the largest silphid (carrion beetle) in North America, reaching 1.0 to 1.8 inches (2.54 to 4.57 centimeters) in length (Wilson 1971, Anderson 1982, Backlund and Marrone 1997). The ABB is black with orange-red markings. The hardened elytra (wing coverings) are smooth, shiny black, and each elytron has two scallop shaped orange-red markings. The pronotum over the mid-section between the head and wings is circular in shape with flattened margins and a raised central portion (Ratcliff 1996). The most diagnostic feature of the ABB is the large orange-red marking on the raised portion of the pronotum (a prominent plate-like structure that covers all or part of the thorax), a feature shared with no other members of the genus in North America (USFWS 1991).

Gender can be determined from markings on the clypeus; males have a large, rectangular, red marking and females have a smaller, triangular, red marking. The age of adults is determined by intensity of appearance. The markings of teneral ABBs (young beetles that emerge during late summer) are brighter and appear more uniform in color while the exoskeleton is softer and in general, more translucent. The pronotum of a mature, early summer adult tends to be darker than the markings on its elytra, with the former appearing dark orange to red and the latter appearing orange. The senescent (mature, post breeding) ABB has pale elytral markings and are more scarred. They often have pieces missing from the margin of the pronotum or elytra, have cracks in the exoskeleton, and /or are missing appendages such as tarsi, legs, or antennae (Bedick et al. 1999).

4.1.2 Life History

Life Cycle

The ABB is a nocturnal species (USFWS, 1991) that lives for only one year (Bedick et al. 1999). ABBs emerge from their winter inactive period when ambient nighttime air temperatures consistently exceed 59º F (15 °C) (Kozol, 1988; Kozol, 1990; Bedick et al. 1999; USFWS 2008). Typically, ABBs are active from May through September in southern portions of their range, but in more northern latitudes of their range, the active period is primarily June through August (USFWS 2019a). ABBs are active at night during their active period; they are most active from two to four hours after sunset (USFWS 2019a). During the daytime, ABBs are believed to bury under soil or vegetation litter (Jurzenski 2012).

Most reproductive activity occurs in June and July (spring to early summer). ABBs require vertebrate carcasses of sufficient size (2.8-7 ounces; 80-200g) for breeding (Holloway and Schnell 1997). The female lays eggs in the soil adjacent to the carcass where they incubate for

about 6 days before becoming larvae (USFWS 2019a). Brood sizes of ABBs can sometimes exceed 25 larvae, but 12-18 is more typical (Kozol 1990). New adult ABBs or offspring (called tenerals), usually emerge in summer, over-winter (hibernate) as adults, and comprise the breeding population the following summer (Kozol et al. 1988, Amaral et al. 2005). While there have been no overwintering studies specific to ABB, Hoback and Conley (2014) conducted overwintering studies in Nebraska with a similar species of carrion beetle (*Nicrophorus orbicollis*) and found depths reflected burial to frost line with the average ranging from 25-51 cm (9.8-20.1 in)

Feeding

Individual ABBs must fly to find food, a mate, and an appropriately sized carcass on or near suitable soils for burial (USFWS 2019a). When not involved with brood rearing, adults' food sources can include selection of an array of available carrion species and sizes, as well as feeding through capturing and consuming live insects (USFWS 1991). In a lab, the ABB was attracted to both avian and mammalian carcasses (Kozol et al. 1988), reptiles, amphibians, and fish (Bedick et al. 1999).

Habitat

The ABB is considered a generalist in terms of the vegetation types where it is found, as it has been successfully live-trapped in a wide range of habitats, including wet meadows, partially forested loess canyons, oak-hickory forests, shrub land and grasslands, lightly grazed pasture, riparian zones, coniferous forest, and deciduous forests with open understory (Walker 1957, USFWS 1991; USFWS 2008; Creighton et al. 1993; Lomolino et al. 1995; Lomolino and Creighton 1996; Jurzenski 2012; Willemssens 2015). Individuals do not appear to be limited by vegetation types as long as food, shelter, and moisture are available; ABBs have been recorded moving between and among these habitat types (Holloway and Schnell 1997; Creighton and Schnell 1998). Trapping success was higher at sites where small mammals were abundant (Holloway and Schnell 1997). The Service believes that preserving large areas of suitable habitat is a conservation strategy that contributes to maintaining viable ABB populations (USFWS 2014).

4.1.3 Numbers, Reproduction, and Distribution

During the 20th century, the ABB disappeared from over 90 percent of its historical range (Lomolino et al. 1995), which covered most of temperate eastern North America. The species was formerly distributed throughout 35 states and three Canadian provinces (Ratcliffe 1996) but is believed to be extirpated from all but nine states in the U.S. and likely from Canada. The ABB is now known to occur in portions of Arkansas, Kansas, Oklahoma, Nebraska, South Dakota, Texas (not documented since 2008), on Block Island off the coast of Rhode Island; and reintroduced populations on Nantucket Island off the coast of Massachusetts, southwest Missouri, and Ohio. A potential report of an ABB in Michigan in 2017 is being investigated to

determine if the area supports ABBs (USFWS 2019a). Figure 4 shows the current range of the ABB. The SSA Report defined populations as analysis areas based on broad geographic and ecological patterns to use in the evaluation of the species (USFWS 2019a).

The 2019 SSA Report on the ABB is based on three conservation biology principles: 1) representation, 2) resiliency, and 3) redundancy (Smith et al. 2018). Representation is generally described as genetic diversity. Resiliency equates to a species' ability to persist considering disturbances that could threaten persistence such as climate, predation, or disease. Maintaining high levels of representation, resiliency, and redundancy improves the likelihood of a species to persist. Redundancy is the maintenance of multiple populations to minimize the risk to species conservation due to catastrophic events.

The populations in Nebraska/South Dakota, Kansas/Oklahoma, Oklahoma/Arkansas, and central Arkansas had been estimated to be greater than 1,000 individuals in 2005 with a total estimated rangewide population of approximately 50,000 individuals (Amaral et al. 2005). However, populations of the ABB fluctuate annually due to the weather, carrion availability, and other factors; thus, these population estimates have little utility unless managers conduct consistent surveys over the course of several years so that we can evaluate trends (USFWS 2008). Such rangewide surveys are not currently conducted for this species and we have limited information by which to measure ABB population abundance (USFWS 2019a). Jurzenski *et al*. (2011) also noted that it is necessary to carefully interpret mark and recapture data due to the assumptions that emigration and immigration do not occur and that all individuals are available for recapture during the sampling timeframe. For the above reasons, the Service used the ratio of positive to negative ABB surveys to determine ABB relative abundance in the population analysis areas, rather than population estimates (USFWS 2019a).

4.1.4 Threats and Conservation Needs

Habitat loss and alteration, availability of carrion, competition with meso-carnivores, inter and intra-specific competition, loss of genetic diversity, disease and pathogens, climate change, pesticides, and artificial lighting were identified as potential risk factors to the ABB (USFWS 2019a). Habitat fragmentation changes the species composition in ABB habitat, lowers the density of indigenous prey species, and results in increased competition for prey (mammals and birds) with vertebrate scavengers (Ratcliffe 1996; Amaral et al. 1997; Bedick et al. 1999). Adults and larvae depend on dead animals (carrion) for food, moisture, and reproduction. Although much of the evidence suggesting the reduction of carrion resources due to habitat change as a primary mechanism driving the decline of the ABB is circumstantial, this hypothesis fits the temporal and geographical pattern of the disappearance of ABBs; and is sufficient to explain why ABBs declined while related species did not (USFWS 2019a). Some remaining populations have risks associated with areas of urban development, but most current ABB populations are in rural areas and have potential risks associated with soil disturbance

activities. Risks associated with the effects of changing climate, including increasing temperatures, are now a significant threat for some analysis areas (USFWS 2019a).

4.1.5 Tables and Figures

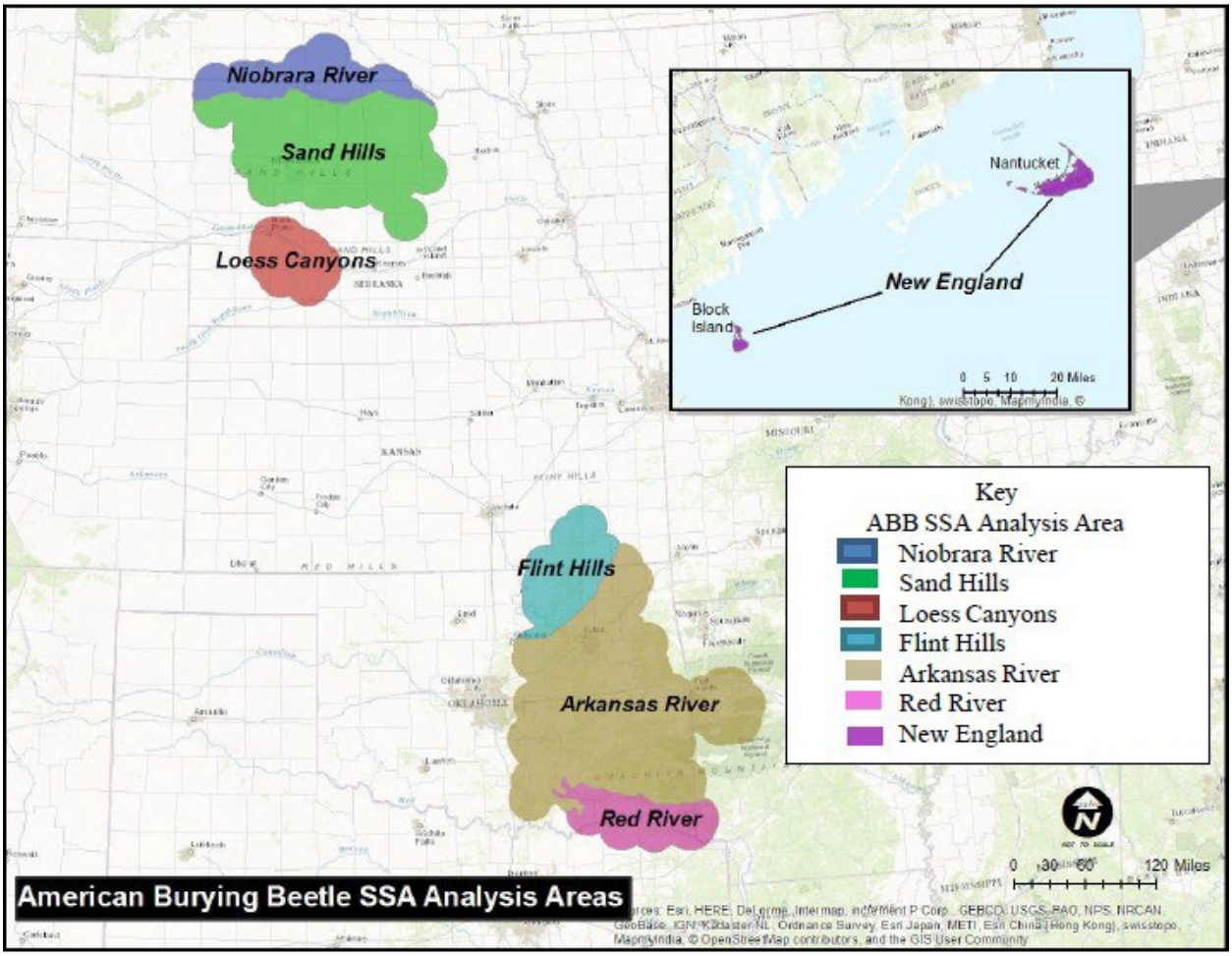

Figure 4. Current Range of the ABB. The ABB Analysis Areas as Described in the SSA (USFWS 2019). The Loess Canyons, Niobrara River, and Sand Hills Analysis Areas are collectively referred to as the Northern Plains Analysis area in Nebraska.

4.2 Environmental Baseline for American Burying Beetle

This section describes the best available data about the condition of the ABB in the Action Area without the consequences caused by the proposed Action.

4.2.1 Action Area Numbers, Reproduction, and Distribution

In Nebraska, the SSA Report identified three separate analysis areas where the species occurs: The Loess Canyons, the Niobrara River, and the Sandhills (Figure 4). Together these three areas make up the broader Northern Plains Analysis Area (NPAA; USFWS 2019a). The Loess Canyons analysis area is in south central Nebraska (primarily south of the Platte River). The

Niobrara River analysis area is located north of the Niobrara River along the Nebraska/South Dakota border and includes portions of southern South Dakota. The Sandhills analysis area occurs in the Sandhills of north central Nebraska. The R-Project overlaps with both the Sandhills and Loess Canyons analysis areas.

Loess Canyons Analysis Area

Approximately 1,686,948 acres of potential ABB habitat occur in the Loess Canyons Analysis Area, including favorable, conditional, and marginal land cover types (USFWS 2019a). When considering the positive and negative factors that affect species resiliency, the SSA Report designated level of resiliency for the Loess Canyons Analysis Area to be Moderate (USFWS 2019a). The analysis area is considered to have several features that support resiliency: 1) the large area of native, suitable habitat in the analysis area; 2) a large proportion of the suitable habitat exhibiting high occupancy rates; and 3) a low proportion of surveys with zero ABB captures. However, there are factors that limit resiliency including cedar encroachment that could fragment habitat and the population's sensitivity to drought conditions. Loess Canyons Analysis Area is more sensitive to disturbance because of its isolation from other analysis areas within the entire Northern Plains Analysis Area.

Sandhills Analysis Area

Approximately 8,633,685 acres of potential ABB habitat occur in the Sandhills analysis area, including favorable, conditional, and marginal land cover types (USFWS 2019a). The Sandhills analysis area has the highest ratio of positive to negative surveys of all the analysis areas. When considering the factors that affect species resiliency, the SSA Report designated level of resiliency for the Sandhills analysis area to be high (USFWS 2019a). The analysis area is considered to have several features that support resiliency: 1) the large area of native, suitable habitat in the analysis area; 2) large areas protected from development; 3) a large proportion of the suitable habitat exhibiting high occupancy rates; and 4) a low proportion of surveys with zero ABB captures.

Permit Area

An approximate 6.3-mile portion of the R Project right-of-way overlaps with the Loess Canyons analysis area. There has not been any ABB recorded during annual survey efforts; therefore, that overlapping area is considered unoccupied habitat (ICF 2026). The permit area for this analysis falls solely within the Sandhills analysis area.

In Section 5.3 of the HCP, NPPD used two methods to calculate a population estimate within the permit/action area: (1) a probability of occurrence model and (2) a mark/recapture study. Jorgensen *et al*. (2014) completed a model to predict the probability of occurrence for ABB throughout the Sandhills. To interpret the model results, Jorgensen *et al*. (2014) suggests that a probability of occurrence greater than or equal to 60% are locations where ABB "does occur," areas with a probability of occurrence between 15 % and 60 % are locations where ABB may

"potentially occur," and areas with a probability of occurrence lower than 15 percent are locations where ABB are absent. Based on this probability level, the Jorgensen *et al*. (2014, entire) model assumes that the permit area contains 503,963 acres of ABB habitat with a probability of occurrence greater than or equal to 60%. Applying a median beetle density calculated from historic trapping data (0.03 ABB/acre) it is estimated that 15,118 ABB may be present within the permit area in a year with a median ABB population. The Service has reviewed NPPD's population estimates, agrees the rationale is based on the best available science, and therefore applies this information and analysis within this BO.

In August 2016, NPPD began annual monitoring using a large-scale protocol-level mark/recapture survey that included 79 traps spread throughout the permit area. This survey effort was completed on the same days in early August 2016 through 2020 (NPPD 2025). ABB were captured each year throughout the east-west portion of the R-Project. NPPD calculated a population estimate using the Schnabel Method. Under the Schnabel Method, biologists conduct sampling events multiple times. Each survey effort notes the number of individuals captured, records the number of individuals recaptured cumulatively, and marks all the new captures. A summary of survey results and population estimates are provided in Table 4, and the locations of the mark/recapture surveys are in Figure 5.

Using a mark/recapture population estimate derived from the 2016 through 2020 survey results, NPPD estimated ABB populations within the 39,500 acres surveyed each year (Table 4). NPPD also estimated the ABB population within the permit area for each year surveyed; these estimates ranged from approximately 4,000 to 16,000 individuals (Table 4).

Previous and Ongoing Take of American burying beetle in Nebraska

There are approximately seventeen (17) individuals permitted to collect ABB specimens within the action area as permitted through section 10(a)1(A) scientific research permits in Nebraska.

The Service consults with Federal agencies on various proposed actions potentially impacting the ABB from soil disturbance in suitable habitat. Project types include pipelines, roads, communication towers, bridges, commercial development, recreational development, transmission lines, and water and wastewater treatment facilities. Impacts from past projects vary in size and duration, with projects either: a) avoiding suitable habitat, b) having temporary and/or permanent impacts remaining below a few acres [i.e., Reclamation, FHWA/NDOT], c) management of garbage [i.e., FERC], d) alterations to project lighting [i.e., FERC], or e) applied avoidance measures for soil disturbance [i.e., FHWA/NDOT]. These consultations have been informal, resulting in take not being reasonably certain to occur, and thus do not provide for incidental take.

For projects where soil disturbance would impact the ABB, the Service had long applied a conservation measure where project proponents would continuously mow areas delineated for soil disturbance and would remove mowing residue so conditions would be unfavorable for

ABB. Project proponents would then remove any carrion up to the point of construction to ensure impacts to ABB are absent from the proposed area of soil disturbance. However, the Service conducted a review of scientific and commercial information, and from this review, the Service could not confirm that all incidental take could be avoided with the application of these measures (USFWS 2023a). Additionally, mowing could result in soil disturbance (i.e., compaction and ground disturbance) that could directly impact ABB through injury and mortality). Carrion removal could also affect ABB if they were inside of carrion that was being removed. Since issuance of this 2023 review, the Service has requested the termination of the combined practice of mowing, residue removal, and carrion removal as an avoidance measure.

Use of Impacts to Habitat as a Surrogate

Predicting the number of individual ABBs that could be taken as the result of a proposed project is often difficult because there is typically no density estimate of ABB within the action area, and presence/absence surveys conducted cannot be used to estimate abundance. Take, in the form of killing and/or harming, is also difficult to precisely quantify and usually cannot be measured in terms of numbers of individuals of ABBs for the following reasons: 1) the ABB has a small body size making it hard to locate, which makes encountering dead or injured individuals unlikely; 2) ABB losses may be masked by annual fluctuations in numbers and highly concentrated movements; 3) ABBs spend a substantial portion of their lifespan underground; and 4) the species is primarily active at night. These factors make it extremely difficult to detect the amount of take that will occur.

The use of habitat as a surrogate in expressing the amount or extent of anticipated incidental take is consistent with existing Service policy. As explained in the Service's May (2015) Final Rule (80 FR 26832) surrogates may be used to express the amount or extent of anticipated take, particularly where it may be impracticable to detect or monitor take of individuals. In these situations, evaluating impacts to a surrogate, such as habitat, ecological conditions or similar affected species may be the most meaningful measure of assessing take and is consistent with the language and purposes of the Act and with relevant case law. As stated in the Service's May 2015 final rule, the use of surrogates in expressing take must describe the causal link between surrogate and take to the listed species, describe why it is not practical to use individuals for the take estimate and how it would be monitored, and set a clear standard for when the amount of take would be exceeded.

The causal link between using acres of habitat as a surrogate (50 CFR 402.14(i)(1)(i)) for take of individual ABBs is the fact that ABBs spend long periods of time relatively immobile and buried a few to several inches below the soil surface during the dormant and breeding seasons, and projects evaluated through biological opinions and Habitat Conservation Plans include ground disturbance. Although ABBs are habitat generalists, they do require suitable soils and vegetation layers. Projects that result in ground disturbance and movement of soil may injure or crush ABBs (adults, larvae, and/or eggs during the active season and adults during the inactive season) or

separate adult ABBs from their larvae or eggs. Soil disturbances that expose the brood chamber or overwintering adult ABBs may also result in mortality caused by desiccation, heat stress, or predation.

Biological opinions with incidental take statements/incidental take permits issued for ABB within the action area that are currently in effect:

FHWA/NDOT Statewide Programmatic Consultation for Future Transportation Improvement Projects in Nebraska over Fiscal Years 2026-2030 (USFWS 2025a). September 29, 2025. This includes 4,087 acres of ABB suitable habitat (946 permanent acres and 3,141 temporary acres) and 7,543 acres of ABB unfavorable habitat.

NDOT Batch Consultation (USFWS 2025b) for In Butte and North, Merritt Reservoir North, Lake Maloney South, Wellfleet South transportation projects, and the Bassett Northeast Mitigation Bank Site, originally approved August 9, 2023, and amended July 9, 2025. This includes 63.92 acres of ABB suitable habitat impact (39.17 permanent acres and 24.75 temporary acres) and 167.51 acres of ABB unfavorable habitat.

The R-Project Transmission construction (prior to 2020 Court decision) included an incidental take permit for ABB for the construction and operation of the project (USFWS 2019b). Project construction that occurred in 2019 and 2020 resulted in 26.77 acres of temporary soil disturbance and 13.07 acres of permanent disturbance of suitable ABB habitat within the Sandhills analysis area. There are no other incidental take permits in Nebraska for ABB.

4.2.2 Action Area Threats and Conservation Needs

Factors Affecting Species Environment within and adjacent to the Permit Area

Eastern red cedar encroachment, drought, land development, light pollution, and scavengers have been identified as threats to the ABB in Nebraska (USFWS 2019a). Beetles are negatively associated with and likely decline in response to habitat loss and fragmentation and increases in row crop agriculture and cultivated croplands (Bishop et al. 2002; Leasure and Hoback 2017). Most of the potential conversion of ABB habitat to cropland requires irrigation. Increased irrigation or other uses of ground water are a risk if they exceed recharge rates and lower the water table. This could reduce habitat suitability by declining aquifer levels and decreasing soil moisture near the surface (USFWS 2019a). Additionally, developed and converted land has led to declines in grassland nesting birds and rodents, which historically provided a large portion of the carrion available to the ABB. Species in this land type (developed agriculture) are often replaced by scavenging mammals and birds that compete with ABB for carrion. Fire suppression in prairie habitats in Nebraska allows the encroachment of woody plant species, particularly the eastern red cedar, which is thought to degrade habitat for ABBs by limiting their ability to forage for carrion (Walker and Hoback 2007). Urban expansion remains a risk and energy development has increased in recent years and may become a larger risk in the future (USFWS 2019a). The ABB is also sensitive to soil moisture and dies when desiccated (Bedick et al. 2006). Other

potential threats listed in the SSA (USFWS 2019a) include inter and intra-specific competition, loss of genetic diversity in isolated populations, disease/pathogens, DDT, and invasive species. Climate change is also discussed and is described in greater detail below (USFWS 2019a).

Climate has always limited the ABB range to some degree. Populations at the northern edge of the historic range were limited by cool nighttime temperatures and shorter growing seasons and could potentially expand north as climates warm. However, there are no current populations near the northern edges of the historic range and habitat limitations rather than climate may prevent existing populations from moving north (USFWS 2019a). Within the Great Plains, including Nebraska, the number of days with the hottest temperatures and the number of nights with the warmest temperatures are projected to increase dramatically for both lower emissions and higher emissions scenario (Shafer et al. 2014). Future precipitation is much more challenging to model and therefore projections of it have more uncertainty as compared to temperature (USFWS 2019a).

Climate change could affect habitat suitability and potentially reduce or expand ABB use of portions of Nebraska. Increasing temperatures and drier conditions potentially associated with climate change could cause reductions in the species' reproduction and numbers. Similarly, milder winters could disrupt hibernation cycles if freezing temperatures do not occur until later in the year or if temperatures consistently reach 55°F to 60°F earlier in the year. Portions of the Sandhills and Niobrara populations are near the northern and western edge of the known ABB range and changes in temperature and moisture could affect suitable habitat in future years (USFWS 2019a). Beetles in the NPAA areas may have a longer time-period for potential reproduction than ABBs in the southern portion of their range. Beetles could emerge from over wintering by late May or June and be ready to reproduce at that time. From June to August, ABBs could have suitable conditions for reproduction in northern areas and that timeframe could be nearly twice as long as the southern portion of the ABB range (USFWS 2019a).

Climate change also has the potential to affect habitat availability through changes in land uses (USFWS 2019a) The National Climate Assessment was conducted by region with Nebraska being a part of the Great Plains Region, and within that report, Shafer *et al*. (2014) noted that rising temperatures in the Great Plains may increase human competition for water. Increased temperatures in the Great Plains states could lead to earlier spring snowmelt, decreased snowmelt season duration, and decreased peak snowmelt flows (Bathke et al. 2014). Increased temperatures would also result in decreased soil moisture due to increased evapotranspiration from vegetation that breaks dormancy earlier. Drought frequency and severity would increase in Nebraska due to increased temperatures and expected seasonal variability in precipitation (Bathke et al. 2014). Increased temperatures could increase water demands and usage for irrigation and potentially lower groundwater levels in aquifers (USFWS 2019a). Also, increased temperatures and longer droughts may increase the percentage of pastures that are heavily grazed or increase the demand for hay and encourage more cuttings (USFWS 2019a).

Habitat conditions, population abundance, and distribution are all likely to be affected by climate change. The Service analyzed in its recent SSA impacts of climate change to populations in the NPAA, which includes all three analysis areas in Nebraska (USFWS 2019a). Under moderate emissions levels, populations in all analysis areas in the NPAA should be maintained through 2099, but some reductions in abundance and distribution are possible as temperatures approach the temperature threshold levels. Specifically, the Sandhills analysis area is highly resilient to the effects followed by the Niobrara River Analysis Area which has moderate resiliency and the Loess Canyons Analysis Area having low resiliency. Potential extirpation is likely for all the NPAA by 2070–2099 under the high emissions level (USFWS 2019a).

4.2.3 Tables and Figures

Table 4. Individual ABB captured per year within the study area (NPPD 2025).

SURVEY LOCATION	INDIVIDUAL ABB CAPTURED				
	2016	2017	2018	2019	2020
Hwy 83	0	0	0	0	0
Purdum	2	3	0	1	0
Brewster	99	46	77	38	62
Hwy 7	118	49	27	12	12
Calamus River	63	8	43	16	15
Gracie Creek Rd	23	23	33	20	27
Hwy 11	122	74	30	13	14
846 Rd	64	91	17	12	33
TOTAL	491	294	227	112	163
Total Survey Area Population Estimate[1]	1,281	714	1,017	343	842

[1] Population estimate reflects the estimated ABB population for the total area surveyed each year as calculated using the Schnabel Method of mark/recapture surveys.

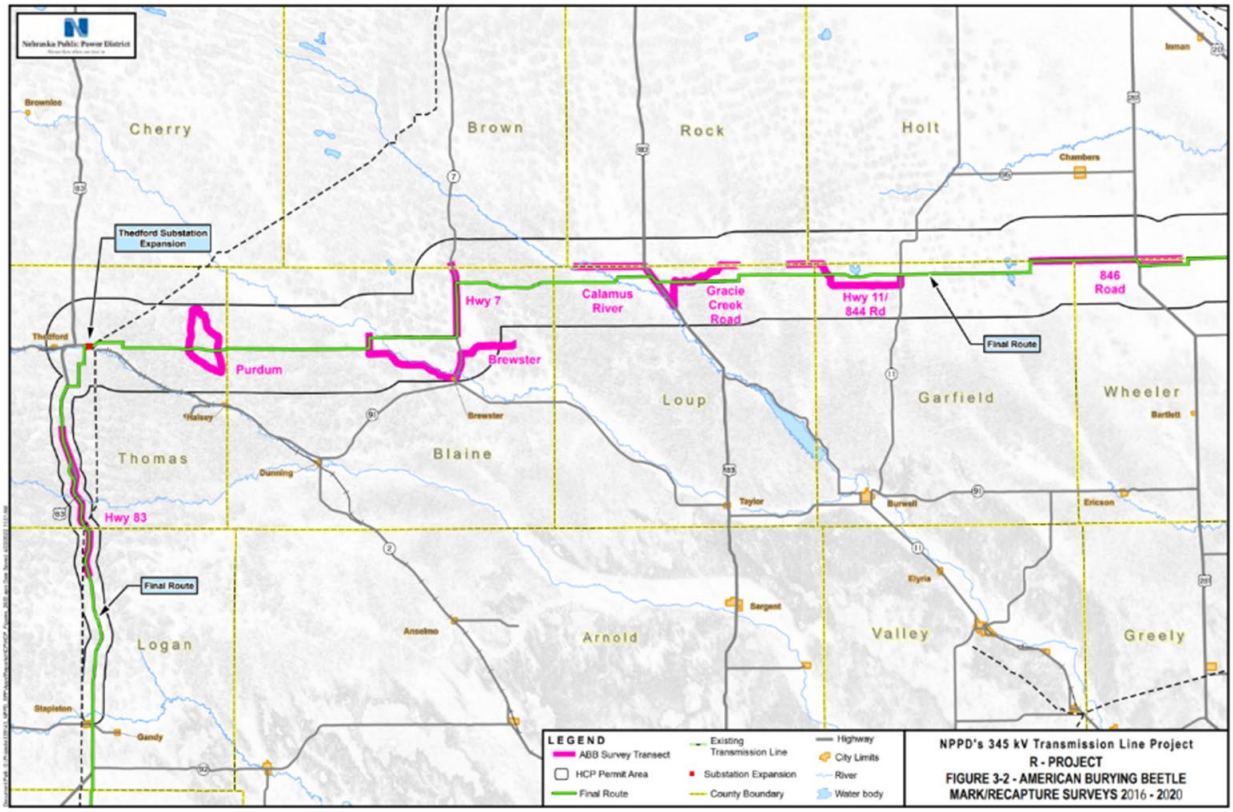

Figure 5. ABB Mark/Recapture Surveys 2016 - 2022 (NPPD 2025)

4.3 Effects of the Action on American Burying Beetle

Effects of the action are a reasonable prediction of the likely response by individuals of a species to and the resulting biological effects from the environmental changes brought about by implementation of the chosen proposed action. As noted previously, the Federal action under consideration is approval of the HCP and issuance of an ITP for incidental take of ABBs associated with the R-Project. The effects of the action to the species will occur through the implementation of the HCP and the issuance of the ITP for the permit term. Effects to ABB from implementing the HCP and issuance of the ITP include mortality or injury due to operation of construction equipment, temporary and permanent loss of habitat, fragmentation of habitat, degradation of habitat through lighting, and temporary disruption of behavior. As referenced in Section 4.1, the 4(d) rule for the ABB prohibits take associated with soil disturbance occurring in suitable habitat and the Project's Covered Activities will result in soil disturbances (both temporary and permanent) in suitable ABB habitat.

In a BO/CO, the effects of the proposed action are all reasonably certain consequences to the species caused by the action, including the consequences of other activities caused by the action. Activities caused by the action would not occur but for the action. Consequences to species may occur later in time and may occur outside the action area.

We identified and described the activities included in the proposed Action in sections 2.1–2.5. We identified and described other activities caused by the proposed Action in section 2.6. Our analyses of the consequences caused by each of these activities follows.

4.3.1 Effects from Project Design and Construction

Crushing and Desiccation of Individuals

An effect to ABB is the loss of individuals, including eggs and larvae in brood-rearing chambers, due to mortality caused by crushing from construction equipment. Removal and physical alteration of vegetation and soil during excavation and grading may crush ABB resulting in injury or mortality. Covered Activities that will not physically alter soils but include the repeated use or parking of heavy equipment may still cause mortality and injury by crushing or preventing the escape of buried ABB.

Covered Activities involving physically altering soils may expose ABB adults, larvae, and eggs, which may result in desiccation, leading to injury or mortality. For the purposes of this analysis, it is assumed that any ABB occupying an area physically disturbed by Covered Activities will suffer mortality via crushing from construction equipment or desiccation as a result of exposure. It is unlikely that ABB would use any temporarily disturbed areas after the initial disturbance. Therefore, ABB would not be at an elevated risk of crushing or desiccation from the repeated use of a temporarily disturbed area by construction equipment.

Habitat Disturbance and Loss

Covered Activities during construction will result in the temporary disturbance of 1,250 acres and conducting covered emergency repair activities in the future could temporarily disturb an additional 250 acres (Table 6). The impact of temporary disturbance from construction compared to the acres of available ABB habitat in the Sandhills is shown in Table 5. Covered Activities for site preparation, foundation installation, structure erection, and potentially pulling and tensioning will likely affect two ABB generations, all at the same location. Habitat removed during site preparation would not be returned to ABB habitat until all construction activities are completed at that location. Permanent loss of habitat from the Covered Activities is 20 acres. Breeding, feeding, and sheltering activities will be affected by any activities that occur in the active season. Prey and carrion availability are likely to be affected by the temporary and permanent loss of habitat since prey will move out of the disturbed areas and not return until those temporarily disturbed areas are restored.

Fragmentation of Habitat

Most access routes will be temporary and will be restored to their previous habitat condition upon completion of construction. Meeting the success criteria for restoration may take up to five years following completion of construction activities. However, prior to the completion of this restoration, temporary access routes may result in the short-term fragmentation of ABB habitat.

Vertebrate scavengers (i.e., American crows, skunks, raccoons) that compete for prey sources may use these temporary access routes as travel corridors into unfragmented grassland habitat, thus increasing competition for ABB until the disturbed areas are restored. However, once revegetated, temporary access routes will not present a permanent travel corridor for vertebrate scavengers into grassland habitats, thereby eliminating this potential form of competition.

Degradation of habitat from lighting

Covered Activities may occur in limited instances at night and will require some form of artificial lighting. ABB, like many insects, are attracted to artificial lighting (USFWS 1991). This attraction to lighted construction areas may disrupt normal ABB feeding behavior or increase the risk of predation by attracting individuals to areas unsuitable for ABB use. Research studies describe the potential effects of artificial lighting on the ABB (Sikes and Raithel 2002), and a recent study identified a connection between ABB activity and nighttime ambient lighting (Wormington et al. 2017).

Potential occurrence of effects from artificial lighting would be limited to the ABB active season of June through August (USFWS 2018a), during which construction activities will be completed during the daytime to the maximum extent possible. Lighting installed at the Thedford Substation would be shielded and low temperature so as to minimize light pollution beyond the substation footprint, thus avoiding potential impacts to ABB. Nighttime work is not anticipated during construction of the R-Project. However, if nighttime construction becomes necessary, construction crews would use downshielded and low-temperature lighting to avoid attracting ABB to the construction area. While, as an insect, ABB may be attracted to any light source, the use of downshielded and low-temperature lighting would reduce or eliminate any potential negative impacts to the species. The Service anticipates that these minimization measures will limit the likelihood of attracting ABBs to the active construction areas and that any effects from lighting would be temporary and short in duration. Permanent lighting of structures within the permit area is not anticipated. While the FAA may require lighting of structures taller than 200 feet, at this time, no structures for the R-Project are anticipated to be taller than 200 feet.

Temporary Disruption of Behavior

Increases in human activity, vehicle traffic, and noise as a result of the Covered Activities may cause ABB to avoid areas occupied by construction personnel and equipment that may otherwise be present in suitable habitat. ABB avoidance of construction personnel and equipment is expected to be temporary. Further, it is expected that ABB would continue to utilize adjacent habitats during the temporary disturbance. Temporary avoidance of limited areas of habitat is expected to have no effect on ABB given the abundance and availability of habitat throughout the Sandhills.

4.3.2 Effects from Operations and Maintenance

Routine operation and maintenance activities will not result in take of ABB due to the proposed avoidance and minimization measures that NPPD will implement. However, emergency repairs may be completed at any time of the year, including the ABB active season, and may include the use of any equipment necessary to complete the repair. Effects from 250 acres of temporary disturbance to habitat associated with emergency repairs within the permit area would be similar to those described for construction under Crushing and Desiccation of Individuals and Habitat Disturbance. Emergency repairs will not likely require the physical alteration of soils but may require the use of equipment that could crush buried ABB. Emergency repairs would employ avoidance and minimization measures when the situation allows. However, some situations, such as storm-related line failure, may require NPPD to act quickly to restore power. In these instances, implementation of avoidance and minimization measures may not be feasible.

4.3.3 Effects from Conservation Measures

In general, conservation measures are considered beneficial or intended to promote the recovery of listed species. They are included actions aimed to avoid, minimize, or offset potential harm from projects to listed species and their critical habitats, ensuring actions do not jeopardize species survival or hinder recovery efforts. As described in Section 2.3.1, NPPD has committed to implement several conservation measures that have been designed to avoid and minimize adverse effects to ABB.

NPPD has considered ABB density and quality habitat (*i.e.*, sub-irrigated wet meadows and mesic grasslands) through the design and route selection of the Project in order to avoid and minimize disturbances to ABB. Most Covered Activities are also planned to occur during daylight hours since ABBs are nocturnal, thus reducing disturbance to ABBs during the time of day when they are active. If construction activities occur at night, lighting measures (*i.e.*, down shielding) will be used to minimize disturbance while they are active. Winter construction will also be utilized to construct when the ABB are hibernating in effort to minimize disturbance to ABB. Conservation measures related to soil improvement, erosion and sediment control, and habitat restoration will ensure that the amount of habitat disturbance is minimized.

NPPD has also committed to protect a minimum of 510 acres of occupied ABB habitat in the Sandhills to offset impacts. Management and protection on large blocks of higher quality/protected lands will contribute to the resilience of the ABB populations affected by this Project. NPPD has purchased a 594-acre parcel within the ABB's Sandhills Analysis Area. This protected parcel is a continuous tract of land that has documented ABB presence along the entire tract. NPPD has completed five years of ABB surveys along public roads adjacent to these mitigation lands. ABB densities on portions of the property are within the upper 10% of densities documented in the Service's ABB database. NPPD, in conjunction with the Service and Nebraska Game and Parks Commission, has developed a management plan for the mitigation parcel that addresses land uses, such as grazing, haying, controlled burning, etc., that will be

utilized to maximize ABB density on the parcel. NPPD will implement this plan and maintain the property in its current grassland land cover that provides habitat for ABB in perpetuity. This mitigation parcel management plan is provided in Appendix F of the HCP. For these reasons and because the number of acres exceeds by nearly 15 per cent the amount calculated based on the Service mitigation strategy for the beetle in the northern range, the Service determines that this mitigation will more than fully offset the impacts of take from the R-Project.

Management activities may have minor temporary impacts to ABB habitat (grazing, haying, burning) but we do not anticipate these activities to rise to the level of take. While it is unlikely, if impacts associated with ABB habitat management (grazing, haying, burning) were to occur, the take would be exempted under the 4(d) rule (85 FR 65241) and already covered by the *Intra-Service Section 7 Biological Opinion on Reclassifying the American Burying Beetle (Nicrophorus americanus) from Endangered to Threatened on the Federal List of Endangered and Threatened Wildlife with a 4(d) Rule, Final Rule* (USFWS 2020), and, thus, adverse and beneficial effects of these Project activities will not be considered within this BO. For these reasons, we do not anticipate any unauthorized take associated with the management of the mitigation lands, with the exception of monitoring surveys. However, monitoring surveys will be conducted by a qualified individual with a Section 10(a)(1)(A) research and recovery permit and would cover any take resulting from such monitoring.

Monitoring and reporting have also been committed to by NPPD. In general monitoring will help determine if conservation measures are contributing to broader ABB population resilience.

4.3.4 Effects from Changed Circumstances Responses

Section 2.4 above and Section 7.2 of the R-Project HCP identifies several changed circumstances and required responses to these changed circumstances:

1) delisting a covered species (section 2.4.1),
2) a new listed species in the permit area (section 2.4.2),
3) natural/anthropogenic disasters (section 2.4.3),
4) climate change (section 2.4.4),
5) data indicating different levels of take (section 2.4.5)
6) data indicating different ABB range within the project area (section 2.4.6)
7) higher than anticipated levels of emergency repairs required (section 2.4.7).

The Service has reviewed these responses to changed circumstances and potential effects to the ABB. Responses to changed circumstances 1, 2, 5, 6, and 7 would include a permit amendment. Any time the Service signs new section 10 permit instrument for an amendment, we must satisfy the review requirements of section 10 permit issuance, including additional public notice, section 7 review, or NEPA analysis. Therefore, any effects to the ABB from these amendments would be analyzed in that Section 7 compliance and is not considered within this opinion. Responses to changed circumstance 3 and 4 (natural/anthropogenic disasters and climate change) include

continued vegetation restoration efforts per the habitat restoration adaptive management. Effects from these changed circumstance responses would be similar to those described for the vegetation restoration actions following construction. Restoration of vegetation following drought, wildfire, and severe storms would result in beneficial effects to the ABB by increasing available habitat in the permit area and ABB mitigation lands following these events. Overall, implementation of responses to the HCP changed circumstances are anticipated to have temporary, short term adverse effects on the ABB that result in long-term beneficial restoration of habitat.

4.3.5 Effects from Other activities caused by the action (renewable energy)

As described in section 2.6.1, Related Renewable Energy, effects to the ABB from related renewable energy projects are not reasonably certain, due to the lack of specific information on wind turbine and solar infrastructure locations.

4.3.6 Summary of Effects of the Action on American burying beetle

Based on the activities discussed above, and their impact to ABB and its habitat, take of ABB is reasonably certain to occur as a result of the proposed action. Some ABBs in all life stages are likely to be injured or killed during construction of the project.

The anticipated disturbance to the ABB habitat includes temporary (1,500 acres) and permanent (20 acres) impacts as a result of the proposed Covered Activities over the 50-year life of the ITP. The Restoration Plan will ensure that the temporary impacts to habitat are restored to provide suitable habitat for the ABB and its prey within 5 years post construction. Table 5 provides a summary of how the impacts to habitat from the R project compare to the available habitat in the Sandhills analysis area.

Incidental take of the ABB is based on the amount of ABB habitat impacted from the R-Project. Because NPPD was unable to access all private lands and assign habitat ratings along the entire route, NPPD assumed that all the acres that the R-Project will disturb are ABB habitat and present equal high-quality value to ABBs. Total incidental take of ABB from the R-Project was calculated by multiplying the area of ABB habitat impacted (acres) by an estimated ABB density (ABBs per acre) (Table 6).

R-Project construction and emergency repairs will disturb an estimated 1,520 acres within the permit area. Temporary (1,500) plus permanent (20) impacts total 1,520 acres. The estimated ABB density was 0.116 ABBs per acre (see further discussion of the ABB density calculation below). The total incidental take is estimated at 176 ABBs[1] (147 from construction; 29 from

[1] The HCP concludes 175 ABBs: 146 from construction and 29 from emergency repairs. The difference between the HCP and Service's conclusion is due to a difference in rounding from the total of 146.163 ABBs. The HCP rounded down, but the Service is rounding up in our conclusion to ensure it captures the maximum amount of take that may occur from the proposed activity. The permit also reflects this difference and allows "no more than 176 ABB."

emergency repairs) for construction and emergency repairs of the R-Project over the 50-year ITP duration.

The ABB density estimate of 0.116 ABBs per acre was calculated using the following information:

- Extensive ABB surveys have been conducted within the permit area for the R-Project and the surrounding area in the Sandhills of Nebraska. These surveys are typically conducted for proposed development projects, including roads, urban development, and energy infrastructure. Researchers and consultants with a Section 10(a)(1)(A) Research and Recovery Permit conduct the ABB surveys and the Service maintains survey results in a database.
- ABB populations fluctuate annually based on climate factors including precipitation and temperature. To account for this fluctuation in the incidental take estimate, NPPD and the Service incorporated numerous years of historic ABB survey results from a larger spatial area in the Sandhills of Nebraska to increase the reliability of conclusions about temporal variability in ABB abundance.
- ABB survey results from 1996 through 2016, including NPPD's ABB surveys of the R-Project from 2016 through 2022, were used to estimate density of the ABB. The permit area is within an area with extensive existing trap data. These data are typically collected for proposed development projects, including roads, urban development, and energy infrastructure, and are not uniformly distributed across the counties included here. Because development projects typically occur along existing access, and for ease of completing large survey transects, the majority of traps were placed along existing roads.
- To ensure that the data used to calculate the take estimate only represents high-quality habitat, only those traps with at least six unmarked ABBs captured across a standardized 5-night sampling effort in the Service database (1996 through 2016) were used. All survey points with less than a 5-night sampling period were removed and surveys with more than five nights were standardized by multiplying the average ABBs per trap night by five.
- The habitat assumption (as discussed above) and database screening criteria yielded a set of data for analysis consisting of 395 ABB survey points. Based on the above screening criteria, it is assumed that the data set is composed almost exclusively of ABB surveys conducted within good to prime habitats in the Sandhills of Nebraska. Further refinement with the screening criteria resulted in 263 total survey points.
- Individual densities for each trap were calculated by dividing the number of ABBs captured in each trap by the effective trap area (500 acres) and then adjusting for a capture efficiency of 90 percent (rounded up from 89.4; Butler 2011). Because of the annual ABB population fluctuation and to reduce risk of underestimation, the take estimate was based on the 99th percentile data point of these ABB density calculations; this resulted in a density estimate of 0.13 ABBs/acre in the previous version of the HCP;

however, with additional survey efforts occurring through 2022, this effort increased the incorporated dataset to 263 data points from 167 data points in the previous HCP version. This inclusion of additional survey points that met the screening criteria resulted in a new 99th percentile of 0.116 ABBs/acre.

4.3.7 Tables and Figures

Table 5. Temporary and Permanent Disturbance from the R Project Compared to Available ABB Habitat (NPPD 2025).

GEOGRAPHIC AREA	ACRES PERMANENT	ACRES TEMPORARY	ACRES AVAILABLE ABB HABITAT	% DISTURBED HABITAT PERMANENT	% DISTURBED HABITAT TEMPORARY
Permit Area	20	1,500	671,423	0.00298%	0.22341%
Sandhills Analysis Area	20	1,500	8,633,685	0.00023%	0.01737%

Table 6. Anticipated Take from Covered Activities Associated with Construction and Emergency Repairs during Operation and Maintenance (NPPD 2025), rounded to whole numbers.

COVERED ACTIVITY	ESTIMATED DISTURBANCE ACRES (Temporary)	ESTIMATED DISTURBANCE ACRES (Permanent)	ESTIMATED ABB DENSITY PER ACRES	ABB TAKE
CONSTRUCTION--Temporary and Permanent				
Access[1]				
Access	387	19	0.116	47
ROW Preparation				
ROW Tree Clearing[2]	22		0.116	3
Temporary Work Areas				
Fly Yards/Assembly Areas	221		0.116	26
Construction Yards/Staging Areas	38.5		0.116	4
Pulling and Tensioning Sites	251		0.116	29
Temporary Structure Work Areas				
Lattice Tower	103		0.116	12
Steel Monopole	173		0.116	20
Construction Contingency				
Construction contingency	40		0.116	5
Distribution Power Line Relocation				
Distribution power line relocation	13.6	0.02	0.116	2
Well Relocation				
Well relocation	0.4		0.116	0.046
Permanent Structure Foundations				
Lattice Tower		0.61	0.116	0.000
Steel Monopole		0.25	0.116	0.000
Construction Subtotal -- Temporary and Permanent	1,250	20	--	147
OPERATION AND MAINTENANCE				
Emergency Repairs[3]	250		0.116	29
TOTAL	1,500	20	--	176

[1]Temporary access routes may be left in place following completion of construction depending on landowner requests and requirements for operation and maintenance of the line. These routes would then be classified as permanent access and represent a permanent impact. No more than 19 acres of permanent access will be left in place in the permit area following construction.

[2]Trees will not be allowed to re-grow within ROW. ROW will be converted to grassland.

[3]Disturbance from emergency repairs is estimated at 20% of the construction subtotal in the permit area. Disturbed areas would be restored if conditions require restoration efforts.

4.4 Cumulative Effects on American burying beetle

In section 3, we did not identify any activities that satisfy the regulatory criteria for sources of cumulative effects. Any future related projects causing soil disturbance in suitable ABB habitat would need to seek coverage under the ESA for compliance. Therefore, cumulative effects to the ABB are not relevant to formulating our opinion for the Action.

4.5 Conclusion for American burying beetle

Opinion

After reviewing the status of the species, the environmental baseline for the Action Area, the effects of the Action/Covered Activities, and the cumulative effects, it is the Service's biological opinion that the issuance of an ITP for NPPD's Covered Activities in Nebraska is not likely to jeopardize the continued existence of the ABB. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusions on the following:

Numbers

We estimate that 176 ABBs will be taken in the permit area for the duration of the ITP as a result of the Covered Activities (see Summary of Effects of the action on ABB). NPPD provided two estimates of ABB population numbers. The Service has reviewed NPPDs population estimates, agrees the rationale is based is on the best available science, and therefore applies these incidental take estimates within this BO. One method relies on the Jorgensen *et.al* (2014) model that assumes beetles are expected to be present where the calculated probability of beetle occurrence is 60% or higher. The permit area contains 503,963 acres of ABB habitat with a probability of occurrence greater than or equal to 60% as identified in Jorgensen *et.al* (2014). The median ABB density in the Sandhills is 0.03 ABB/acre based on the same ABB survey data used to calculate take. Using a density of 0.03 ABB/acre, it is estimated that 15,118 ABB may be present within the permit area in a year with a median ABB population.

The second approach relies on annual beetle surveys to estimate the beetle population within the permit area to look at potential impacts to that local population from R-Project take. Based on mark and recapture data from 2016 to 2020, the permit area contains approximately 4,000 to 16,000 ABBs. The population viability analysis by Amaral *et al.* (2005) concluded that ABB populations of 1,000 or more individuals are viable long-term in the absence of severe catastrophic events or reduction in carrying capacity through a reduction in carcass availability, habitat loss, or fragmentation. Amaral *et al.* (2005) indicates that populations of greater than 10,000 ABB can persist even through catastrophic events. Amaral *et al.* (2005) also estimated that the Sandhills beetle population to be about 10,000 beetles.

The Service's 2019 SSA for ABB (USFWS 2019a) identified 8,633,685 acres of Sandhills analysis area as either favorable or conditional habitat. The Service used the ratio of positive to negative ABB surveys to determine ABB relative abundance in population analysis areas (USFWS 2019a). The ratio of positive to negative ABB surveys in the Sandhills analysis area was defined as the highest condition category of "good," with the highest ratio of positive to negative surveys compared to other analysis areas (USFWS 2019a). Using the simplified comparison of acres disturbed versus available acres of habitat, the disturbance of 1,520 acres (temporary and permanent habitat) of ABB habitat represents approximately 0.018% of favorable or conditional habitat available in the Sandhills analysis area. The R-Project will not impact the long-term persistence of the Sandhills ABB population because the 176 individuals we expect the project to take within the permit area represent only a small percentage of the estimated Sandhills population under either population scenario; this level of population loss does not represent a catastrophic event or a reduction in carrying capacity. With little to no impact on the Sandhills population, we do not expect there would be any effect on the rangewide population estimated by Amaral (2005) to be approximately 50,000 individuals.

Reproduction

We anticipate that habitat disturbances from the R-Project activities during the construction period (approximately 21 to 24 months) would prevent ABB reproduction. Reproduction is not likely to resume until the disturbed habitat is successfully restored. When construction begins, all ABBs present would be killed, and ABBs would not colonize the area until restored habitat is suitable. Therefore, no reproduction would occur for 3 to 7 years in each area disturbed by construction. Once habitat is restored and prey re-inhabit the area, ABBs in nearby habitat would likely recolonize and begin reproducing. Areas temporarily disturbed by construction activities will be used more than one time by NPPD for various activities throughout the construction process and will not be restored until construction is complete. We do not expect ABBs to inhabit the disturbed areas during construction due to the lack of habitat and prey species. NPPD will stabilize, revegetate, and restore temporarily disturbed areas within 3 to 5 years after construction and have established an escrow account to ensure successful restoration. The ABB and other disturbed wildlife species, including prey species, are likely to return to the area following construction when personnel and equipment are no longer present and suitable habitat has been restored (within 3 to 7 years after initial disturbance). Although habitat for reproduction will be lost during construction and site restoration, the high amount of habitat existing both within the NPAA and surrounding the project is anticipated to offset localized reproductive losses, resulting in minimal impact to the species overall. In addition, loss of reproductive output due to individual mortality is anticipated to be negligible at the population level, given the widespread distribution and high abundance of the species in the surrounding suitable habitat.

Distribution

The ABB is distributed throughout the permit area and much of the surrounding Sandhills. The majority of the impacts to habitat will be temporary (1,500 acres), while permanent loss of habitat will be 20 acres. Those temporary impacts represent approximately 0.017 percent of the estimated Sandhills analysis area. As discussed above, the temporarily impacted habitat would not be occupied by ABBs until the habitat is successfully restored 3 to 7 years later. Once restored habitat reaches suitability criteria, ABBs and their prey from nearby areas are likely to recolonize. Thus, distribution would change slightly due to this temporary disturbance until recolonization occurs; these aspects of the range would not be permanently affected. However, ABBs would not recolonize the permanently lost habitat areas. But those 20 acres are scattered throughout the permit area and, even in totality, represent a small fraction of the occupied range of the ABB in the Sandhills. Therefore, we do not anticipate any meaningful impacts to the ABB's rangewide distribution

5. Whooping Crane

This section provides the Service's biological opinion of the Action for the whooping crane.

5.1 Status of the Whooping Crane

This section summarizes best available data about the biology and condition of the whooping crane (*Grus americana*) throughout its range that are relevant to formulating an opinion about the Action. The Service published its decision to list the whooping crane as federally endangered under the ESA on March 11, 1967 (32 FR 4001, USFWS 1967).

Critical habitat (USFWS 1978) for the whooping crane will not be affected by the proposed action. The nearest designated critical habitat is located on the central Platte River bottoms area over 60 miles away from any portion of the R-Project transmission line and 25 miles from the nearest related renewable project.

5.1.1 Species Description

Whooping cranes are the tallest bird in North America. Males, generally larger than females, approach 1.5 meters (m) (5 feet (ft)) with wingspans of 2.5 m (8.2 ft). Aside from the relatively small differences in size, whooping cranes are sexually monomorphic (Walkinshaw 1973). Adult plumage is snowy white except for black primaries, black or grayish alula (specialized feathers attached to the upper leading end of the wing) and a dark gray-black wedge-shaped patch on the nape. Covering the crown, anterior part of the occiput and a narrow strip extending from the bill down the cheek is an almost featherless patch of granulated reddish skin; some black hairlike feathers occur on the crown and malar region (Ridgeway and Friedman 1941). The strong bill is a dark olive-gray which becomes lighter during the breeding season. The area at the base of the bill is pink or rosaceous. The legs and feet are gray-black (Allen 1952).

5.1.2 Life History

The whooping crane, a long-lived species, has four life stages; egg, colt/juvenile, subadult, and adult. Whooping crane typically lay two eggs, but primarily only raise one chick. After hatching, colts are flightless for approximately 80 to 100 days. Juveniles remain with their parents for approximately 1 year and then often join other juveniles and subadults on the peripheries of established adult territories before their parents establish a new nest. Whooping cranes do not become sexually mature adults until approximately age four. Current estimates suggest a maximum longevity in the wild of at least 30 years (Mirande et al. 1991), although individuals under human care have reached ages over 40 years.

5.1.3 Numbers, Reproduction, and Distribution

All whooping cranes are descended from 14 nesting adults in 1941 (Allen 1952); thus, the whooping crane survived a severe population bottleneck. Currently, there are four populations of whooping cranes, including three in the wild and one captive population. Two populations, the Eastern Migratory Population (EMP) and Aransas-Wood Buffalo Population (AWBP), migrate between nesting and wintering grounds, while the Louisiana Non-migratory Population (LNMP), remains year-round in southern Louisiana. The EMP and LNMP are designated as non-essential, experimental populations (66 FR 33903; 76 FR 6066) under section 10(j) of the ESA and are supported by continued releases of captive-bred birds, albeit natural recruitment occurs in both populations (USFWS 2011). The AWBP is the only population that is federally listed as endangered and is the only population impacted by the proposed action. As such, population descriptions, ecology, and stressors described further will focus on the AWBP.

The AWBP is the only remaining self-sustaining wild population. This population migrates between its nesting grounds in Wood Buffalo National Park in Northwest Territories, Canada to its wintering grounds on the Texas coast. The migration corridor is a narrow path through central North America that includes portions of Nebraska, including the proposed project site (Pearse et al. 2018a). Since its nadir in 1941, the AWBP has slowly increased over many decades in response to conservation actions and legal protections. It was estimated that there were 557 whooping cranes wintering in the AWBP in January 2025, demonstrating a long-term annual growth rate of 4.33% (Butler et al. 2025), though population growth has sustained a modest 2.2% more recently over the last decade.

Whooping cranes in the AWBP follow an annual phenology of wintering in coastal Texas, spring migration, nesting in northern Canada, and fall migration. As spring approaches, family groups and pairs are usually among the first to depart the wintering grounds (Pearse et al. 2020), often assisted by strong seasonal southeast winds. First departure dates are normally in March (USFWS 2025c) though public observations, confirmed by trained biologists or photos indicate occasional early migration records of individuals in the southern migration states (OK, KS, NE)

in late February. Recent records indicate temporal changes in whooping crane migration resulting in earlier spring migration (Jorgensen and Brown 2017; USFWS 2025). Spring migration is usually completed in 2 to 4 weeks. Parents separate from their young of the previous year upon departure from Aransas National Wildlife Refuge (ANWR), in northward migration while in route to the breeding grounds, or soon after arrival on the breeding grounds (Allen 1952; Stehn 1992).

Autumn migration normally begins in mid-September for the AWBP, with most birds arriving on the wintering grounds between late-October and mid-November. Similar to shifts in spring migration phenology, more recent data (2009-2014), indicates a shift in migration for the AWBP with later arrival at ANWR (Pearse et al. 2020; Butler and Bidwell 2024), and occasional late migrants have recently been documented remaining in fall migration (Nebraska) into January (USFWS 2025). Whooping cranes are diurnal migrants, flying during the day, and making regular stops to feed and rest. Large groups of 20 or more may use the same stopover location. Recent research suggests group sizes during migration are growing larger; congregations of 46 whooping cranes were observed within the same field along the central Platte River in Nebraska and over 100 have congregated together during fall in their Saskatchewan, Canada, staging grounds (Caven et al. 2020; Baasch et al. 2023). Migration routes were first determined by mapping confirmed sightings from the USFWS public sightings tracking partnership (USFWS 2025; Stephen 1979; Austin and Richert 2001; Pearse et al. 2018a), and later tracking of whooping cranes marked with radio and/or satellite transmitters provided insight on migration and habitat use (Howe 1989, Kuyt 1992; Pearse et al. 2018b; Pearse et al. 2020). The duration of AWBP's fall migration is longer than the spring migration, largely due to an extended period of fall staging in Saskatchewan, Canada. In the United States portion of the migration corridor, however, time spent in fall migration is often shorter than spring.

Whooping cranes use a variety of habitats during migration (Howe 1987, 1989; Lingle et al. 1991; Johns et al. 1997; Baasch et al. 2019). Areas characterized by wetland mosaics appear to provide high quality stopover habitat (Johns et al. 1997). During migration, whooping cranes primarily use shallow, seasonally and semi-permanently flooded palustrine wetlands for roosting, and various cropland and emergent wetlands for feeding (Johns et al. 1997; Austin and Richert 2001). Large palustrine wetlands included in this category are those at Quivira NWR in Kansas, Salt Plains NWR in Oklahoma, Cheyenne Bottoms State Wildlife Area and the adjacent Nature Conservancy Cheyenne Bottoms Preserve in Kansas, Last Mountain Lake NWA in Saskatchewan, and large reservoir margins in North and South Dakota. Riverine habitats are frequently used during migration. Whooping cranes roost on submerged sandbars in wide, unobstructed channels that are isolated from human disturbance (Armbruster 1990). Impounded palustrine and lacustrine systems and rivers are more used during drought, when water availability is limited (Pearse et al. 2024). Even though there may be variation in the type of roost sites used, when available, whooping cranes primarily prefer palustrine and riverine

wetlands for roosting during migration and favor shallow water for roost sites (Austin and Richert 2001).

5.1.4 Threats and Conservation Needs

Whooping cranes are impacted by a variety of stressors across their annual life cycle including: human development (including land conversion, altered fire regimes and woody plant encroachment, decreased freshwater riverine inflows, collisions with structures, chemical spills, and shooting), climate change (including warming temperatures, precipitation change, sea level rise, increased wet and cold extremes, fewer days below freezing, and decreased snowpack), predation and pests, loss of and limited genetic diversity, limited success and capacity to support reintroduced populations, inadequate regulation, and disease (CWS and USFWS 2007; Brightwell et al. 2025). Human population growth and associated anthropogenic development has historically impacted whooping cranes through habitat alteration and destruction. This source causes numerous stressors that negatively impact the resources needed by whooping cranes. Human disturbance and infrastructure such as roads, buildings, etc. is known to cause varying levels of avoidance (Baasch et al. 2019) and increases the likelihood of whooping cranes prematurely flushing under ill-advised flight conditions (low-light, poor weather), causing energetic losses or increased chances of collision with objects.

Habitat loss

Land conversion and hydrologic alteration due to agriculture and development affects whooping cranes through habitat loss, fragmentation, and degradation. This stressor directly reduces the availability and quality of all habitats necessary to whooping cranes, including during migration. Land conversion for agriculture continues to negatively affect cranes by rendering former habitat unsuitable for nesting, feeding, roosting, and migration stopovers (Mirande and Harris 2019), though they opportunistically utilize agricultural waste grain for feeding where nearby roosting habitat is available. Habitat degradation may also increase susceptibility to predation, a known cause of mortality of whooping cranes (Brightwell et al. 2025).

Habitat loss is continuing to impact the AWBP through the reduction of native prairie wetlands used throughout the migratory route. As a result of this habitat loss, the migration corridor has narrowed, and migratory whooping cranes appear to be concentrating use in the remaining high quality wetland habitat (Pearse et al. 2018b; Caven et al. 2020) or shifting their migration Eastward in search of more available habitat. This may lower their individual fitness through increased stress and energetic expenditure, and it may increase their susceptibility to disease and mass mortality events. For example, in October 2025, the first two cases of whooping crane mortality resulting from “highly pathogenic avian influenza” were documented during migration in Saskatchewan, Canada where a number of whooping cranes were congregated together. These impacts may decrease adult, subadult, and juvenile survival. In addition to agricultural conversion, land conversion resulting from development has negatively affected whooping

cranes due to the construction of roads, buildings, power lines, towers, and wind turbines. The building of cities and towns directly destroys, as well as fragments, whooping crane migratory habitat. While solar infrastructure is often located on previously altered flat land such as agriculture fields, if solar infrastructure was cited in otherwise suitable roosting habitat, this would render it entirely unsuitable and lost.

Infrastructure Avoidance

Recent research shows that presence of human infrastructure such as transmission lines, human development, and wind turbines can also result in indirect impacts to whooping crane through partial or complete avoidance (Ellis et al. 2022; Pearse et al. 2021). That is, even if suitable habitat occurs on the landscape but is near to human infrastructure, whooping crane will avoid, or at a minimum reduce use of the habitat, effectively making it mostly inaccessible, less suitable, and generally unavailable to the species. This is a substantial impact considering the already limited amount of habitat on the landscape. Data show that a zone of influence where use was less than expected extended out to 1.24-miles surrounding transmission lines and 3.1-miles surrounding wind turbines (Ellis et al. 2022; Pearse et al. 2021). Future data from phase two telemetry may provide insight into potential alterations to whooping crane migration pattern when confronted with wind infrastructure. While it is unknown whether whooping cranes avoid these areas by flying over the top or around, an energetics study was conducted to evaluate potential effects if whooping cranes diverted around them flying some additional distance using non-migratory forward-flapping flight (Pearse and Selbo 2012). In a corn dominated landscape (generally describes much of Nebraska), whooping cranes may be required to spend an additional day foraging for additional flight between 10 km – 100 km.

Existing literature is lacking on the potential effects of solar infrastructure on whooping cranes and whether avoidance would extend beyond the immediate infrastructure to include a zone of influence similar to transmission or wind infrastructure. While not complete avoidance, otherwise suitable habitat within this area is considered degraded, or lost for roosting and foraging, leading to a functional loss of habitat (Ellis et al. 2022).

Collision with Infrastructure

Whooping cranes are susceptible to collisions with human-made structures such as power lines. Human development has led to additional structures across the whooping crane's migration route and in areas where birds move between roosting and foraging locations during other times of the year, thus increasing the potential for these collisions and direct mortality of whooping cranes. Collisions with power lines are a cause of whooping crane mortality during migration and wintering (Brown et al. 1987; Lewis et al. 1992; Harris and Mirande 2013; Sime et al. 2024; Brightwell et al. 2025). Since 1956, collisions with power lines are known to be responsible for the death of at least 10 individuals in the AWBP (Brightwell et al. 2025). Weather conditions most associated with power line collisions are related to reduced visibility (e.g., fog, dense cloud

cover, and precipitation), and reduced flight control (e.g., high-velocity winds) (Stehn and Wassenich 2008). The likelihood of power line and other collisions may be compounded when conditions, such as drought, force individuals to move outside of their typical habitat or territories, traveling more through potentially novel areas to seek better foraging and roosting habitats. Risks of collision increase over time as the population grows and habitat loss within the migratory corridor concentrates birds in the remaining habitat located in novel, unfamiliar landscapes. Wind infrastructure is believed to pose a potential risk of collision, though collision with a wind turbine has not been documented.

Climate Change

Climate change is causing a variety of changes to the ecosystems that whooping cranes depend upon throughout their life cycle. It drives numerous stressors that negatively impact the resources and conditions needed by whooping cranes. Climate change is expected to exacerbate drought conditions which could decrease food availability and thus foraging habitat as well as suitable roosting habitat availability. Research shows that drought conditions alter stopover habitat selection by whooping cranes and that they may be less likely to avoid habitat near transmission lines (zone of influence decreased from 1.24-miles to 0.62-miles) near suitable habitat during these conditions (Ellis et al. 2022). These climate driven ecosystem changes could potentially increase transmission line collision risk for whooping cranes due to decreased habitat availability and an increased likelihood of utilizing the remaining high-risk habitat near energy infrastructure.

Conservation/Recovery Needs

The current Recovery Plan for the species sets forth two primary objectives and measurable criteria that would be used to evaluate if the species warrants reclassification to threatened (downlisted) (CWS & USFWS 2007). Objective 1 is to establish and maintain self-sustaining populations of whooping cranes in the wild that are genetically stable and resilient to stochastic environmental events, with specific population targets based on the number of self-sustaining populations on the landscape. Currently neither reintroduced population is self-sustaining. Therefore, alternative criterion 1B is appropriate for the AWBP. Criterion 1B calls for 1,000 individuals and 250 productive pairs in the population for at least 10 years. Objective 2 is to maintain a genetically stable captive population to ensure against extinction of the species. The criterion to achieve Objective 2 is to maintain 153 whooping cranes in captivity (21 productive pairs). Currently there are 144 birds under human care, with individuals being added to this population in an attempt to reach the goal of 153.

To increase the size of the AWBP, specific recovery actions are called for in the 2007 Recovery Plan. Many of these recovery actions are related to the proposed project evaluation. These include, but are not limited to: reduce mortality via collisions with human infrastructure (Recovery Action 1.3.3); minimize disturbance from human activities, such as construction

projects (Recovery Action 1.4.1), protect and create essential habitat in the migratory corridor (Recovery Action 1.5), ensure long-term protection of migratory stopover sites (Recovery Action 1.5.3.2), and manage habitats to provide essential resources for whooping cranes (Recovery Action 1.5.4).

5.2 Environmental Baseline for Whooping Crane

This section describes the best available data about the condition of the whooping crane in the Action Area without the consequences caused by the proposed Action.

5.2.1 Action Area Numbers, Reproduction, and Distribution

The Action Area is located entirely within the migration corridor for the AWBP of whooping cranes (Pearse et al. 2018a). This Action Area is located within a portion of the Sandhills region of Nebraska that contains widespread and abundant wetland habitat interspersed among grasslands and is commonly used as stopover habitat for whooping cranes during migration, providing valuable roosting habitat. With broad expansive sandbed river systems stretching across the state from West to East, Nebraska boasts the highest proportion of riverine roosts of any other U.S. state and riverine sites make up the majority of whooping crane roost locations in Nebraska (Austin and Reichert 2005). No whooping crane breeding habitat occurs within the Action Area.

R-Project Transmission Line Action Area Numbers and Distribution

The transmission line portion of the action area stretches through the entirety of the 50% and 75% migration corridor in addition to the majority of the western portion of the 95% corridor while avoiding the eastern portion of the 95% corridor (see Figure 2). This innermost portion of the corridor (50%) represents the area that the highest density of individuals can be expected to migrate through biannually.

To determine whooping crane numbers and use within the action area, the Service evaluated three sources of whooping crane records: 1) public sightings records from 1942-present maintained within the Nebraska Ecological Services Field Office (USFWS 2025), 2) phase 1 telemetry records from 2009-2018 (Pearse et al. 2020b), 3) phase 2 telemetry records from 2017-2024 (WCTP 2025). Data from sources #1 and #2 indicate 28 whooping crane groups have been documented utilizing habitat within the transmission line portion of the Action Area and the closest whooping crane record to this existing line is less than 0.5-mile. We were unable to identify exactly how many unique whooping cranes from Phase 2 telemetry (#3 above) utilized the Action Area (see below). Records indicate occasional to moderate consistent use of wetlands and surrounding areas within the 4-mile construction area on both sides of the proposed line (e.g. the Action Area) as well as within the narrower 1.24-mile avoidance buffer. Data from these

records represents a small proportion of the population that likely utilized the Action Area as public sightings and telemetry data is not all inclusive.

Phase 2 telemetry data for this project was provided by the Whooping Crane Tracking Partnership (2025) using a Nested Hexagonal Framework (NHF). Under this hierarchical multiscale framework, individual records (one per roost night) were combined and summarized, and mapped in grids and at a scale where it is not always possible to know exactly where an individual roosted, or whether the unique individuals used multiple hexagons nearby during the same migration stopover, accounting for records at multiple scales in multiple places, or if the same individuals were between different migrations (i.e., increasing the potential for double counting). While the NHF summarizes and masks the ability to identify the total number of roosts that were unique to one individual in one year without double counting for nearby roosts in other hexagons the same migration stopover, it was useful in spatially evaluating general patterns of use visually such that we could evaluate geographic areas where roosts were more common compared to others with lower densities or absence of records.

To evaluate the status of the species within the Action Area, we compared the habitat and species use of Action Area to the landscape throughout the entire Study Area used by the National Environmental Policy Act Supplemental Environmental Impact Statement (ICF 2026). We also evaluated data available from the U.S. Energy Information Administration (EIA) 2025, U.S. Electric Power Transmission Lines to understand existing transmission lines within the Study Area and Action Area. Within the larger Study Area and this geographic region of the Nebraska sandhills, wetlands and riverine habitat are generally abundant and widely distributed outside the Action Area. Based on visual analysis of the NHF habitat use by whooping cranes, the Action Area currently receives similar, but less use than other areas (particularly North of the Action Area) within the Study Area (See Figure 6).

Within the Action Area, NPPD performed an analysis indicating approximately 8,969 acres (3.1% of the total Area) of potentially suitable roosting habitat are present within 1-mile of the proposed route of the transmission line. Given the previously discussed zone of influence extending out 1.24 miles from the proposed line, we extrapolated that approximately 11,121 acres of suitable roosting habitat may be present near the transmission line (8,969 acres x 1.24 miles). The broader Sandhills ecoregion and landscape generally has a similar concentration and distribution of suitable wetland roosting habitat, therefore, this extrapolation is a reasonable estimate of the amount of habitat in the 1.24-mile buffer vs. the 1-mile buffer used when delineating the whooping crane action area in section 2.7.2.

Renewables Action Area Numbers and Distribution

For wind energy infrastructure, location information and size was available in variable levels of detail and resolution and the larger footprint across varying regions in Nebraska prevented phase

two telemetry access from being granted. Therefore, while we were unable to obtain the most recent telemetry records (phase two telemetry), we evaluated known information in the geographic context of the size and position within the migration corridor and spatially analyzed whooping crane records (phase one and public sightings), where possible or appropriate. Three proposed wind projects within the whooping crane migration corridor are related to the R-Project and have known project boundaries, allowing us to evaluate whooping crane records within these areas (see sections 2.6 and 2.7.2). We applied a 3.1-mile buffer (5-km) for all three projects (e.g., renewable energy action area) to account for the area beyond the project boundaries that whooping cranes are expected to avoid, and adverse effects may occur. This avoidance area around Greeley Wind Action Area encompassed 62,965 acres. Within this area, one whooping crane group record (telemetry) has been documented. The avoidance area around Prairie Hills Wind encompassed 172,211 acres and contained records of two whooping crane groups (both telemetry). The avoidance area around Steeple Wind encompassed 284,088 acres and a combined three records of whooping crane groups (two public sightings, one telemetry) were documented.

When compared to the remainder of the whooping crane migration corridor within Nebraska, utilization of the renewable energy action area (including the 3.1 mile buffer) indicates low utilization of this area. Given the low utilization and desktop analysis of habitat conditions using aerial imagery, we concluded that applying the same ratio (3.1% of total area is suitable whooping crane habitat), as determined within the transmission line portion of the Action Area, would be appropriate. Applying this ratio would result in a conservative overestimate of habitat when applied to the renewable energy action area. Using this approach, we estimate a total avoidance footprint of approximately 519,264 acres combined in the renewable energy action area, and an estimated 16,097 acres of suitable roosting habitat within the renewable energy action area. As previously discussed, this estimate of suitable roosting habitat is likely an overestimation.

The Thunderhead Wind Energy Center Project (Thunderhead Wind), in Antelope, Wheeler, and Holt counties, is already constructed and in operation (WAPA 2022). Therefore, the construction and currently approved levels of operation of the project is considered as part of the environmental baseline in the action area.

Previous and Ongoing Take of Whooping Crane in the AWBP

The only population impacted by this proposed action is the remnant wild AWBP, which is federally designated as “endangered” under the ESA. As such, we will describe the previous and ongoing take authorized for the AWBP only. While the below activities are outside of the action area of this consultation, they result in impacts and take to the migrating individuals that migrate through the action area.

Research and Recovery Permits

- Recovery Permit 048806 authorizes a broad suite of activities to support the recovery of the whooping crane, including conservation breeding, reintroduction efforts, research projects, and monitoring. The issuance of Recovery Permit 048806 and the activities therein are covered by Biological Opinion 2024-0140736 dated November 27, 2024. The Recovery Permit and associated Biological Opinion authorizes the injury or death of one whooping crane per year as a result of capture for wellness purposes and monitoring.

Habitat Conservation Plans (HCP)

- The Lower Colorado River Authority's Transmission Services Corporation's HCP covers construction, operation, upgrade, decommissioning, repair, and maintenance of electrical transmission lines, substations, access roads, and related infrastructure and facilities in 241 Texas counties. Permit TE-42299D & Consultation No. 02ETAU-2019-F-0402 authorizes that no more than 1,973 acres of whooping crane wintering habitat may be adversely affected over the duration of the 30-year permit.
- Oncor Electric Delivery Company LLC's HCP covers new construction, operation and maintenance of transmission lines, substations, switching stations, and a distribution network. Permit TE-40918A & Consultation No. 21450-2010-F-0184 authorizes no more than 1 whooping crane may be adversely affected over the duration of the 30-year permit.

Past and Present Formal Consultations

- The Department of the Air Force's Operations at 32 CONUS Installations include military aircraft flight operations on and around the airfields, which encompass takeoffs, landings, and local training and maintenance flights for aircraft home-based at the installation, as well as transient aircraft operations. Routine ground maintenance activities, including de- icing, refueling, and engine run-ups (checks conducted prior to takeoff to diagnose engine problems or assess thrust performance), are also part of the Action. The Biological Opinion for this project (FWS Log #: 09E30000-2023-0090495-S7) authorizes 1 whooping crane from airline strikes.
- The establishment of the Platte River Recovery Implementation Program (PRRIP) provided for the implementation of recovery activities for certain species, including the whooping crane, while also providing for the continued operation of certain ongoing and new water-related activities. The Programmatic Biological Opinion (PBO) for the PRRIP, first finalized in 2006 and re-initiated in 2018, authorizes for depletions of water that impact whooping crane habitat and provides for mechanisms to offset depletions, while also providing funding and authorization to conduct project activities, such as environmental flow releases, habitat restoration and monitoring. The PBO authorizes the take of 1 whooping crane in the form of harm and 6 whooping cranes in the form of harassment from project activities over 13 years (2018 to 2031) and provides coverage

for continued water development. This allotment of take was provided for in both the 2006 PBO and the 2018 re-initiation. Since establishment, over 200 Biological Opinions have tiered off the PBO for take authorization for water depletions in Platte River Basin.

- Corps of Engineers' permit issuance to H&C Oil Operating, Inc. for discharge of fill material to facilitate oil drilling operations in Barton County, Kansas, near the Federally designated critical habitat Cheyenne Bottoms Wildlife Area. The 2014 BO authorized the permanent loss of 0.02 acres of suitable wetland habitat that would be permanently removed from use by whooping cranes as a result of the proposed action, with 0.75 acre temporarily disturbed during construction phases.
- Western Area Power Administration's interconnection request for transmission to support a 51-megawatt wind farm by Wessington Wind I LLC, near Wessington Springs, SD. The Biological Opinion estimated take of 3600 acres of habitat, via whooping cranes avoiding the wind farm. It indicated this would potentially impact approximately 12 birds per year within the action area, i.e. the project footprint plus an area within 35 miles of the project location. Direct mortality of whooping cranes by the wind farm (as represented by a carcass) is expected to be zero.
- A Biological Opinion for U.S. Department of Agriculture- Rural Utilities Service's South Dakota Prairie Winds Project in Aurora, Brule, and Jarauld Counties was completed in 2010. This Biological Opinion found that the proposed project was likely to adversely affect whooping cranes due to the loss of habitat and avoidance of habitat within and adjacent to the Project but did not issue incidental take as the adverse effects were determined to not rise to the level of take.
- A Biological Opinion for U.S Department of Agriculture-Rural Utility Service's funding of the construction and operation of a new substation and 10-mile long 138k transmission line near the Cimarron River in Oklahoma was completed in 2025. This Biological Opinion estimated take of one whooping crane from collision and the loss of 303 acres of roosting habitat due to avoidance of the habitat near the transmission line.

5.2.2 Action Area Threats and Conservation Needs

Transmission Lines

According to existing transmission line data available and evaluated online through the EIA (2025), there are no existing transmission lines within the Action Area in the 50% or 75% corridor. Whooping cranes are generally able to utilize habitat within this Action Area free from disturbance and with little urban development or infrastructure, though infrequent roads or rural development are present. There are existing transmission lines within the outermost 95% corridor of the Action Area. Within the outermost 95% corridor, transmission lines increase in their distribution while whooping crane records (telemetry and public sightings) become less frequent. Other threats within the Action Area include habitat conversion (agriculture conversion, road/human infrastructure development), as generally described in Section 5.1.4.

Permanent protection of habitat within the Action Area is presently lacking and remains a conservation need to prevent future threats from further reducing available habitat.

This data indicates there are 3 segments of existing transmission lines totaling approximately 34 miles in the Study Area that are within the 50% migration corridor (zero within the Action Area). These existing transmission lines traverse the landscape in a primarily north-south orientation. Between the 50% and 75% corridor, there are approximately 38 miles of additional transmission lines present in the Study Area. These are oriented either diagonally (e.g. northeast to southwest) or north-south. These existing routes are primarily oriented in a parallel direction to traditional whooping crane migration routes.

Renewable energy

Wind energy infrastructure also exists within the Action Area. One wind farm (Thunderhead Wind) was previously constructed with an interconnection to an existing transmission line and underwent ESA Section 7 consultation and wind turbines were constructed adjacent to the Eastern most six-mile segment of the proposed line. This wind farm consists of 171 turbines across 65,000 acres and extends from the farthest Eastern edge of the 75% corridor East into the 95% corridor. There are no existing solar energy infrastructure within the Action Area.

5.2.3 Tables and Figures

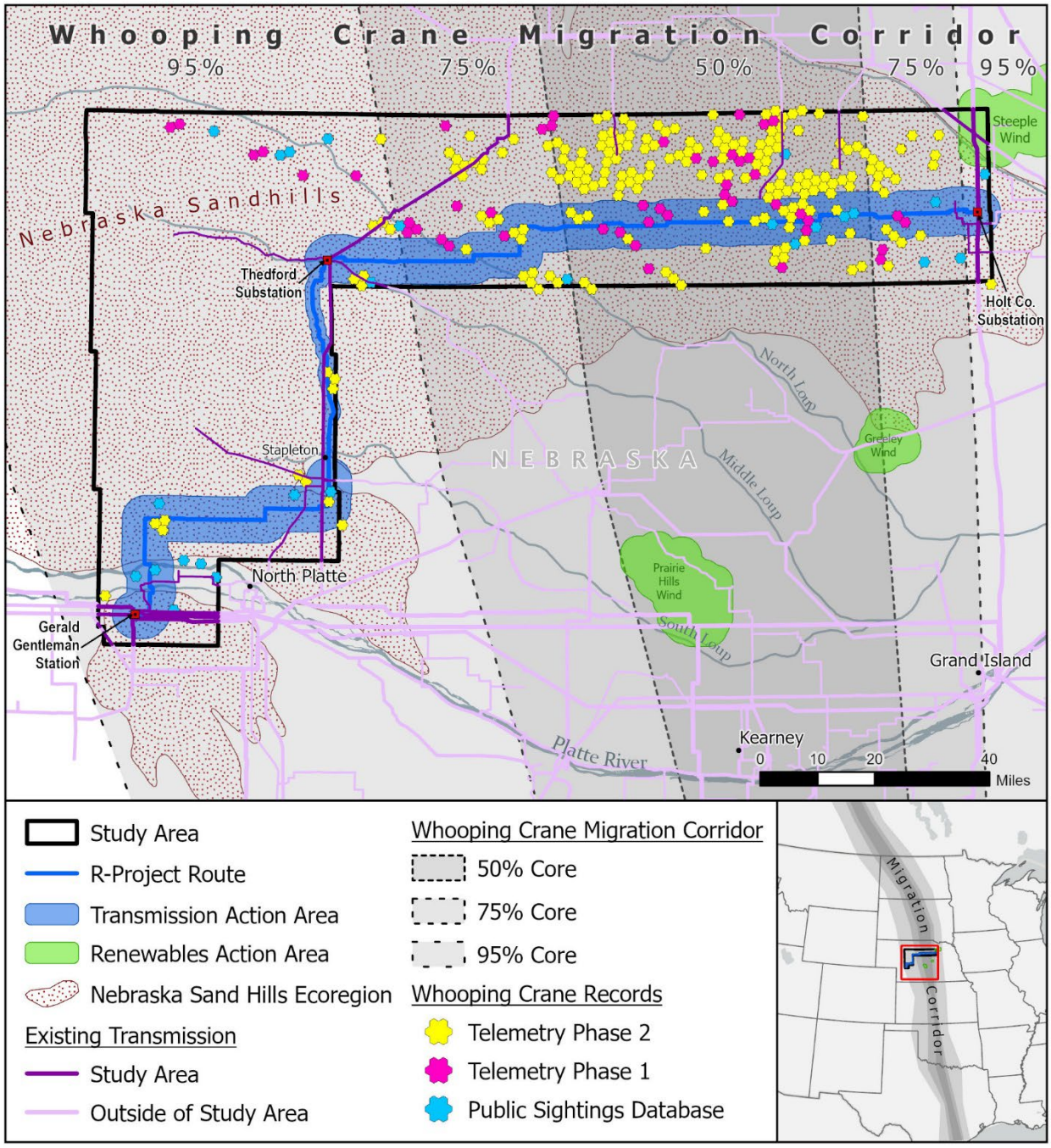

Figure 6. Whooping Crane occurrence records and existing electric transmission facilities within the Action Area.

5.3 Effects of the Action on Whooping Crane

In a BO/CO, the effects of the proposed action are all reasonably certain consequences to the species caused by the action, including the consequences of other activities caused by the action. Activities caused by the action would not occur but for the action. Consequences to species may occur later in time and may occur outside the action area.

We identified and described the activities included in the proposed Action in sections 2.1–2.5. We identified and described other activities caused by the proposed Action in section 2.6. Our analyses of the consequences caused by each of these activities follows.

5.3.1 Effects from Project Design and Construction

Construction of the R-Project may result in disturbance or cause whooping cranes to avoid roosting and feeding habitat within the 4-mile buffer of the line. Activities related to construction and staging of equipment have been minimized by conservations measures (Section 2.4.2, *Whooping Crane Avoidance and Minimization Measures*). Temporary and permanent disturbance areas, such as construction yards/staging areas, fly yards/assembly areas, structure work areas, temporary access, and structure locations were sited to avoid potentially suitable whooping crane habitat where possible and will follow the whooping crane protocol which includes surveys prior to conducting work within the migration season and avoiding disturbance if an individual is present. However, some proposed construction may overlap with portions of the whooping crane migration, and construction activity could be near roosting and feeding locations in some instances. We anticipate these potential effects may result in a low intensity temporary disruption of behavior.

5.3.2 Effects from Operations and Maintenance

The proposed transmission line project will present additional collision risk and avoidance of suitable roosting and feeding habitat within the Action Area, most prominently within the 1.24-mile avoidance buffer. Habitat within 1.24 miles of the transmission line is likely to be reduced or lost (functionally lost as habitat under some or most conditions). Given the lack of current development or disturbance within the Action Area and the larger Study Area as a whole, the transmission line will reduce suitable stopover habitat for roosting and feeding through avoidance of transmission line infrastructure.

NPPD will avoid maintenance activities during the whooping crane migration period (Section 2.4.2 *Whooping Crane Avoidance and Minimization Measures*).

Collision risk with transmission lines during migration

The potential for collision mortality is a potential effect of the R-Project on the AWBP of whooping cranes individuals that are migrating through and/or using wetlands, rivers and agricultural fields as migration stopover habitat. The majority of whooping cranes flights within the action area would be migratory over the line at high elevation and exposure to the line would not occur. A small proportion of the population would be exposed to the transmission line and collision risk up to twice per year (spring and fall migration) for a short period if they descend to lower elevations in search of stopover habitat and for a continued period of time if and as long as they choose to roost in the vicinity of the line. There is a greater collision risk for individuals ascending and descending to and from migratory flights as well as when making local, low-flight movements to and from foraging and roosting habitat. This risk is exacerbated during weather conditions that decrease visibility of the transmission line or limit maneuverability of birds due to wind.

The proposed transmission line runs generally east-west across much of the migration corridor. Exposure and accompanying collision risk is thereby restricted to whooping cranes making low-level non-migratory flights associated with stopover roosts and feeding. The proposed R-Project route within a 1.24-mile buffer on both sides stretches almost entirely through both these corridors (50 and 75%) in an east-west orientation, perpendicular to typical whooping crane migration routes. Within this region (50 and 75% corridor of the Study Area), the proposed Project would approximately double the miles of transmission lines on the landscape which is currently largely undeveloped.

Within the outermost 95% corridor on the western side of the Action Area, the proposed R-Project turns in a north-south orientation and runs generally adjacent and quasi-parallel to another existing transmission line from Thedford, NE, following South along Highway 83. This section of the action area runs parallel to whooping crane migration paths in a north-south orientation. Transmission lines running north-south are thought to pose a higher risk as collision risk exposure would continue for a longer period of time (low level ascending/descending flights) as long as the line runs parallel or adjacent to their migration path. Similarly, north-south line routes may result in flight deviation or increased flight distances more than east-west lines, due to longer exposure to habitat avoidance. The R-Project proposed orientation has a lower collision risk profile for these reasons compared to a similar length transmission line oriented parallel to their core migration corridor.

The opportunistic nature of stopover site selection, the relatively low number of birds in the AWBP, habitat conditions, weather, and other innumerable/unquantifiable factors (i.e. distance from last stopover, time of day, etc.) play a role in the likelihood of whooping cranes encountering the R-Project transmission line and having exposure to collision. Individuals of the AWBP may be at/near the Action Area twice annually during spring and fall migration, every year, or not at all. Including high elevation migratory crossing, the

maximum encounter rate for any individual is likely two times per year, likely for less than a week, and perhaps only for the few moments it takes to fly over the line. Species absence for several years at a time is possible as whooping cranes have low site fidelity across the population as a whole (Pearse et al. 2020). Overall, given the myriad of factors listed above, and considering that the Action Area receives similar or less annual use compared to surrounding areas, high seasonal use of the Action Area by whooping cranes is not anticipated.

While complete avoidance of habitat surrounding the R-Project developments are not anticipated, a zone of influence indicating at least modest avoidance of habitats is likely. Under drought conditions, this zone of influence is reduced to 0.62 miles, increasing exposure (Pearse et al. 2021). Generally, however, this avoidance behavior reduces risk of collision under most conditions apart from reduced visibility and/or adverse weather.

While numerous different methods to calculate collision risk have been developed and attempted to predict the likelihood of collision, existing records confirm the difficulty in predicting if, when, and where collisions may occur. One-third of all confirmed documented mortalities of whooping cranes are "unknown cause" and while additional information is available for some that suggest mortality is more or less likely in one category (Brightwell et al. 2025), we considered an applicable ratio for these individuals based on the number of known collisions relative to other sources of mortality.

Unlike sandhill cranes (*Antigone canadensi*s), studies' estimating collision rates are not available for whooping cranes presently but additional insight from telemetry may eventually allow for refined estimates or collision rates. Given their overall low population size and limited data, the Service relied on a method developed to calculate collision risk into the future based on "Reasonably Certain Knowledge" (RCK) (USFWS 2019c) that includes parameters such as existing and project proposed transmission line miles in Nebraska, known confirmed whooping crane mortalities (including power lines), and population growth rate predictions, among other things (Appendix D of the HCP provides extensive detail into this evaluation and is incorporated by reference). For this reason, the Service relied on the RCK as a reasonable method for evaluating the likelihood of collision and the potential for direct take of whooping cranes. Combined with other factors (e.g. transmission line location, use of the area and similar habitat in the region, and orientation [North, South, East, West]), we evaluated the risk profile that the R-Project transmission line poses.

After calculating collision risk using RCK and then incorporating proposed line marking with bird flight diverters (estimated to reduce collisions by ~50-80%; Yee 2008, Brown and Drewien 1995, Morkill and Anderson 1991), collision risk is not reduced to zero but the R-Project is predicted to result in less than 0.5 whooping crane collisions over the life of the

50-year Project (NPPD HCP Appendix D, 2025)[2]. For these reasons, incidental take from collision is not reasonably certain to occur as a result of the R-Project.

Feeding and roosting habitat avoidance during migration due to the transmission line

The Service spatially analyzed data from public sightings, phase 1 telemetry, and NHF phase 2 telemetry. The proposed action of construction and operation of the transmission line is likely to reduce the use of existing suitable roosting and feeding habitat within the Action Area through avoidance, resulting in functional loss of suitable habitat. Availability of roost sites during migration is crucial for whooping cranes to rest and restore energy. Whooping crane stopover habitat is not believed to be limiting within this region of the migration corridor but will be reduced and could temporarily disrupt the behavior of whooping cranes seeking stopover habitat in this area. As discussed in Section 5.1.4, *Threats and Conservation Needs*, recent research indicates that the presence of transmission lines can result in indirect impacts to whooping cranes through avoidance. Whooping cranes tend to avoid landing near transmission lines by roughly 1.24 miles, which can render nearby suitable roosting and foraging habitat less suitable, leading to a functional loss of habitat (Ellis et al. 2022). Whooping cranes that need to detour to other roosting sites that are further away may expend more energy during migration and use poorer quality habitat. Numerous detours to less suitable roosting and feeding sites could reduce the fitness of migrating whooping cranes and concentrate birds in the remaining habitat.

As previously mentioned in Section 5.2.1, *Action Area Numbers, Reproduction, and Distribution*, we estimate that approximately 11,121 acres of suitable habitat near the transmission line will be reduced or lost, resulting in adverse effects to whooping cranes. Of this, NPPD estimates 28.9 acres of suitable habitat will be temporarily disturbed and 0.013 acres of permanent habitat destruction will occur. For the purposes of this evaluation, we consider all 11,121 acres to have reduced use of this habitat.

While habitat is present nearby outside the Action Area, a consequence of this habitat loss may result in whooping cranes potentially needing to spend extra time in migration to replenish fat reserves or show up to the wintering/nesting grounds with reduced fat reserves. Based on previous research on whooping crane energetics during migration in corn-dominated landscapes, we anticipate the combined habitat loss may result in whooping cranes spending additional time foraging to replenish fat reserves and find suitable stopover habitat (they could travel up to an additional 100-km and replenish those reserves in one day of foraging) (Pearse and Selbo, 2012). Whooping cranes have demonstrated resilience and adaptability during migration as a strategy to overcome environmental change (Pearse et al. 2018b).

Recent telemetry data indicating variable beginning and end dates, length of stopovers, and

[2] Consideration of "less than 0.5 whooping crane collisions," (i.e., rounding down) is appropriate for general application of the "reasonable certainty" standard for incidental take. If take of a species is requested and authorized, any estimates of take would be rounded up within a permit as the "maximum authorized" level.

overall length of migration suggest whooping cranes are adapted to minor year-to-year variation based on weather, climate, wind, habitat and preexisting physiological conditions. To better understand the number of whooping cranes that may be exposed (annually) to this loss of habitat or increased collision risk, we performed a sensitivity analysis. Whooping crane migration spans ~2,425 miles in a northwest to southeast orientation (Wood Buffalo National Park, Northwest Territories, Canada, to Aransas National Wildlife Refuge, Corpus Cristi, TX) and the average number of unique migration stopover roosts in migration is 11-12, suggesting an average daily migration segment distance of 211 miles (2,425/11.5). Extrapolating that to the proportion of the Action Area (where habitat loss is projected) in relation to the daily migration distance, approximately 2.48 miles of this 211-mile daily migration would be rendered less suitable or unsuitable entirely, suggesting 1.18% of their habitat is reduced in quality or removed on one migration segment (2.48/211=0.118).

While whooping crane migration use of the proposed route appears to be less than surrounding areas to the North of the Action Area, this analysis assumes every whooping crane in the population will cross the R-Project every migration one time in a north-south manner. This is reasonable given the R-Project's orientation, but whooping cranes may be migrating to the East or West of the action area. Alternatively, individuals may cross the R-Project multiple times on rare occasions given our knowledge of their migration behavior (more likely along the western edge of the Action Area where the line would have a north-south orientation and exposure continues for any whooping crane whose migration route continues along and near the R-Project).

The alteration to normal migratory processes may occur, but is not likely to significantly alter feeding, breeding, or sheltering, and remains challenging to measure. Under ESA, "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined (50 CFR § 17.3) is an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. While the loss of habitat associated with this Proposed Action constitutes adverse effects and a temporary disruption of behavior, this is not anticipated to rises to the level of take under the ESA, given that habitat remains available both locally and regionally.

Emergency Repairs and Routine Maintenance

Outside of emergency repairs, which often occur outside the whooping crane season, routine maintenance activities will be scheduled to avoid the whooping crane season further reducing the potential for adverse effects and therefore is not likely to result in adverse effects to whooping crane. Emergency repairs completed during the whooping crane migration season would result in avoidance of roosting and feeding habitat within 0.5 miles of the activity, similar to those described in Section 5.3.1 for effects from construction. We anticipate these potential effects may result in a low intensity temporary disruption of behavior.

5.3.3 Effects from Conservation Measures

Conservation measures have been designed to avoid and minimize adverse effects to whooping cranes. Activities described within those measures will attempt to avoid disturbance of whooping cranes by avoiding their migration period when possible. However, some activities that are being completed as a conservation measure for ABB, such as helicopter construction, may occur during whooping crane migration season. NPPD has committed to avoiding sensitive features in the daily flight plan which may include large concentrations of waterfowl or cranes. Daily whooping crane surveys will be completed during whooping crane migration periods, with construction-related activities avoided within 0.5 miles of observed whooping cranes. Therefore, risk of whooping crane collision with helicopters is anticipated to be low. However, any whooping cranes in the vicinity of helicopter construction activities may have avoid or leave the area. Whooping cranes may migrate through outside their traditional migration dates and potentially be exposed to low levels of disturbance and avoidance from helicopter construction and other conservation measures, such as installation of line marking devices. Beneficial effects are anticipated as a result of the permanent protection and management of 594 acres of suitable whooping crane habitat that NPPD has committed to as a component of the Project.

5.3.4 Effects from Changed Circumstances Responses

Section 2.4 above and Section 7.2 of the R-Project HCP identifies several changed circumstances and includes required responses to these changed circumstances:

1) delisting a covered species (section 2.4.1),
2) a new listed species in the permit area (section 2.4.2),
3) natural/anthropogenic disasters (section 2.4.3),
4) climate change (section 2.4.4),
5) data indicating different levels of take (section 2.4.5)
6) data indicating different ABB range within the project area (section 2.4.6)
7) higher than anticipated levels of emergency repairs required (section 2.4.7).

The Service has reviewed these responses to changed circumstances and potential effects to the whooping crane. Responses to changed circumstances 1, 2, 5, 6, and 7 would include a permit amendment. Any time the Service signs new section 10 permit instrument for an amendment, we must satisfy the review requirements of section 10 permit issuance, including additional public notice, section 7 review, or NEPA analysis. Therefore, any effects to the ABB from these amendments would be analyzed in that Section 7 compliance and is not considered within this opinion. Responses to changed circumstance 3 and 4 (natural/anthropogenic disasters and climate change) include continued vegetation restoration efforts per the habitat restoration adaptive management. Effects from these changed circumstance responses would be similar to those described for the vegetation restoration actions following construction. Restoration of vegetation following drought, wildfire, and severe storms would result in beneficial effects to the whooping crane by increasing available habitat in the permit area and ABB mitigation lands

following these events. Overall, implementation of responses to the HCP changed circumstances are anticipated to have temporary, short term adverse effects on the whooping crane that result in the long-term beneficial restoration of habitat.

5.3.5 Effects from other activities caused by the action (renewable energy)

As discussed in Section 2.5, *Other Activities Caused by the Action*, renewable energy projects, including wind projects with turbines are also reasonably certain to be constructed as a result of the R-Project and are "but for" the proposed action. To determine whether effects from these other activities are reasonably certain for whooping crane, we reviewed the available information about the nine projects identified in Section 2.5 in context of potential effects to whooping crane.

First, we evaluated whether the proposed renewable energy project is within the 95% whooping crane migration corridor. If not located within the 95% whooping crane migration corridor, we have determined that effects to whooping crane are not reasonably certain to occur. Second, we evaluated whether we had enough information about the proposed renewable energy project to evaluate effects as reasonably certain based on whooping crane life history and known threats.

Collision with Renewable Energy Infrastructure

As stated in Section 5.1.4, *Whooping Crane Threats and Conservation Needs*, whooping crane collision with wind turbines has never been documented to date (Brightwell et al. 2025). Given the strong avoidance of wind energy infrastructure, the lack of documented collisions with wind energy infrastructure, we conclude that effects from wind energy infrastructure is not reasonably certain to result in take from collision with renewable energy infrastructure. Solar renewable energy infrastructure is generally a low-profile and whooping crane collision risk has not been documented. As stated in Section 2.5, the Service is not aware of any specific information is known about any additional transmission lines necessary to connect renewable energy to the R-Project or other transmission lines on the electric grid. Therefore, whooping crane collision risk with that infrastructure cannot be evaluated.

Feeding and roosting habitat avoidance during migration due to related renewable energy projects

Depending upon the final sighting location, construction of wind turbines may result in reduction or loss of suitable habitat for whooping cranes. In Section 5.2.1, we estimated the 16,097 acres of roosting habitat exists within the action area for renewable energy. It is assumed that these 16,097 acres will be reduced or lost due to avoidance within 3.1-mile buffer around wind energy infrastructure. Combined with other forms of habitat loss from the transmission line and existing literature on whooping crane energetics in a corn dominated landscape (Pearse and Selbo, 2012), we anticipate this could result in up to one additional day of foraging required to replace energetic demands during migration.

Increased operation and production from Thunderhead Wind is anticipated as a result of the R-Project. However, after evaluating the effects of the as-built project within the existing project footprint, the permanent approval of increased energy generation caused by the proposed action are not anticipated to result in habitat loss or reduction, and no additional adverse effects from increased generation are currently known.

As described in section 2.6.1, Related Renewable Energy, effects to the whooping crane from related solar projects are not reasonably certain, due to the lack of specific information on solar infrastructure locations.

We conclude that effects from related wind energy infrastructure would result in an additional loss of habitat due to avoidance, and may result in adverse effects, but is not reasonably certain to result in take.

5.3.6 Summary of Effects of the Action on Whooping Crane

The proposed project is relatively expansive, altering quality and suitability of 11,121 acres of habitat for whooping cranes along the transmission line and 16,097 within and surrounding related renewable energy projects. This loss or degradation of habitat (partial or complete avoidance) is anticipated to impact whooping cranes twice annually during migration for any whooping cranes that may have otherwise selected to utilize the Action Area. Combined, we estimate 27,218 acres of suitable roosting habitat will be reduced or lost as a result of the R-project and related renewable energy construction (11,121 + 16,097).

This response to disturbance and development temporarily disrupts and adversely affects whooping cranes. While sufficient habitat is anticipated to remain available in this geographic region, combined with avoidance of any wind turbines or other human development, the Project may result in whooping cranes requiring additional time (up to one additional day) in migration to maintain sufficient energy needed for migration and breeding. While the proposed action increases the risk of injury and direct mortality to whooping cranes from collision with the transmission line, these effects have been reduced by conservation measures and effects rising to the level of "take" are not reasonably certain to occur.

Any unanticipated losses of individuals through collisions with transmission lines could have an impact on future recovery. The loss of those individuals and the future recruitment related to the individuals reduces the rate of population growth and extends the timeline for recovery. Whooping cranes are relatively long-lived species with low reproductive rates. As demonstrated through population viability analysis, adult survival is a key metric for species viability (Traylor-Holzer 2019). The loss of even a few adults or juveniles can have a large effect on population growth and resiliency. Whooping crane populations grow slowly under

the best conditions and additional impacts to reproduction or survival can reduce recovery rates substantially. The long-term growth rate (winter 1938–1939 to winter 2024–2025) in the whooping crane population has averaged 4.33% (n = 83; 95% CI = 1.78–6.80%), but growth rates over the last decade are closer to 2% for unknown reasons (Butler et al 2025).

While the proposed action of construction and operation of the R-Project and related renewable energy projects are not anticipated to result in the direct mortality of individuals, the continuing cumulative loss of important stopover habitat can affect the ability of migrating whooping cranes to restore and maintain their body condition during migration. Birds that arrive at nesting areas with reduced body conditions usually have reduced reproductive success. Birds in poor condition may not nest that year or nesting may be delayed and fewer eggs laid.

However, the loss of 27,218 acres of potential stopover habitat occurs within an area where sufficient habitat remains and does not rise to the level where the loss of individuals is likely or reproduction is reduced. Additionally, exposure risk is reduced by the primarily East/West orientation and conservation measures (including marking lines with BFD's), and the Project is not reasonably certain to result in take and is not likely to impair recovery. Sufficient habitat remains functional at the local and range-wide scale to maintain the viability of the implementation of proposed conservation measures will help minimize project-related impacts to recovery in the future.

NPPD has committed to conservation measures as well as acquisition, protection, and management of 594 acres of suitable habitat for the incidental take permit's covered species (American burying beetle). This habitat also constitutes highly suitable whooping crane habitat with recent documented phase 2 telemetry records by multiple whooping cranes. Permanent protection of whooping crane habitat within the migratory corridor aids in preserving migration habitat and contributes positively toward recovery actions, and offsets habitat losses throughout the migratory corridor. The current whooping crane recovery plan outlines actions related to two categories: 1) reducing impacts from human infrastructure/activities (e.g. mortality via collisions, disturbance from human activities/construction); and 2) create, protect, and manage habitat to provide essential resources for whooping cranes. The R-Project will contribute positively and negatively toward those goals. It will add transmission/human infrastructure that presents added collision risk which is counter to recovery actions but also reduces this risk by marking the proposed line and existing line already on the landscape with bird flight diverters. The R-Project will also reduce the amount and quality of suitable whooping crane habitat while also providing long-term protection and management of existing habitat.

5.4 Cumulative Effects on Whooping Crane

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this Opinion (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. While we did not identify any specific non-Federal activities occurring in the action area that are reasonably certain to occur (see Section 3), human infrastructure including roads, buildings, power lines and wind energy development unrelated to the R-Project proposed action is likely to continue or increase in locations near the action area. These projects are typically private actions with no existing federal nexus. An increase in human infrastructure near this portion of the migration corridor would cause whooping cranes to avoid additional stopover and feeding habitat during migration. At some point these actions may constrain available habitat such that migration routes become altered, and whooping cranes congregate and crowd together in remaining habitat. Existing wind and power line infrastructure has already resulted in areas within this region that are reduced or lost as habitat. The result of existing renewable energy development and transmission lines combined with future development could contribute toward further constriction of the migration corridor and at some point, this continued development may lead to a condition where migration habitat becomes limited in this region.

5.5 Conclusion for Whooping Crane

Opinion

After reviewing the current status of the whooping crane, environmental baseline for the Action Area, effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the adverse effects for the proposed construction and operation of the R-Project Transmission Line project will not jeopardize the continued existence of the whooping crane and will not adversely modify critical habitat. The conclusion of this Opinion is based on full implementation of the proposed action as described in the Description of the Proposed Action section of this Biological Opinion and incorporates all conservation measures that were included in the Habitat Conservation Plan.

The R-Project Transmission Line project and related renewable energy development will impact a total of 27,218 acres of suitable whooping crane habitat. Minor alterations to migration paths may occur resulting in short-term changes to the distribution of whooping cranes throughout this region of the migration corridor. The reduction or loss of habitat may result in whooping cranes diverting around the proposed transmission lines and inter-related wind turbines, or avoiding habitat and continuing migration, thereby using important fat reserves. Based on energetics research for this landscape type, we anticipate this may require whooping cranes to spend up to one additional day in migration foraging as a result of the Project.

Numbers

- Take of whooping cranes is not reasonably certain to occur during the 50-year lifespan of the transmission line project, and we do not anticipate the effects of this project will reduce the number of whooping cranes or have a population-level effect due to the presence of surrounding suitable habitat, the project's East/West orientation through the primary portion of the migration corridor, and the low likelihood of collision with the transmission line.
- NPPD has proposed conservation measures to minimize disturbance, habitat impacts, and collisions (marking lines with bird flight diverters) and will restore, protect and manage 594 acres of stopover habitat which will reduce project-related impacts.

Reproduction

- The alteration in migration patterns is not anticipated to negatively affect fitness in a manner that adversely affects reproduction. Sufficient habitat is present in the vicinity of the action area capable to provide nutrients needed for whooping cranes to be in sufficient condition for successful reproduction and at most whooping cranes may spend one additional day in migration which will not negatively affect reproduction.
- Nesting habitat is not present in the action area and will not be altered by the proposed action.

Distribution

- Distribution of whooping cranes within the migration corridor may be altered if migratory diversions or delays occur. However, we do not anticipate the amount of habitat reduced or lost, or the potential energetic losses from altered behavior will result in delayed or altered reproductive success, long term fitness, or survival.

6. Monarch

This section provides the Service's biological opinion of the Action for the monarch butterfly.

6.1 Status of the Monarch

This section summarizes best available data about the biology and condition of the monarch butterfly (*Danaus plexippus*) throughout its range that are relevant to formulating an opinion about the Action. The Service published a proposed rule to list the monarch as federally-threatened under the ESA on December 12, 2024 (89 FR 100662, USFWS 2024b). The proposed rule also includes protective regulations under Section 4(d) of the ESA and designation of critical habitat, all of which is in California.

6.1.1 Species Description

The monarch *(Danaus plexippus)* is a species of butterfly in the order Lepidoptera (family Nymphalidae). Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. The black border has a double row of white spots, present on the upper side and lower side of forewings and hindwings (Bouseman and Sternburg 2001). Adult monarchs are sexually dimorphic, with males having narrower wing venation and scent patches (CEC 2008). The bright coloring of a monarch is aposematic, as it serves as a warning to predators that eating them can be toxic.

6.1.2 Life History

During the breeding season, monarchs lay their eggs on their obligate milkweed host plant (primarily Asclepias spp.), and larvae emerge after two to five days (Zalucki 1982; CEC 2008). Larvae develop through five larval instars (intervals between molts) over a period of 9 to 18 days, feeding on milkweed and sequestering toxic cardenolides as a defense against predators (Parsons 1965). The larva then pupates into a chrysalis before eclosing 6 to 14 days later as an adult butterfly. There are multiple generations of monarchs produced during the breeding season, with most adult butterflies living approximately two to five weeks; in migratory populations the overwintering adults enter into reproductive diapause (suspended reproduction) and live six to nine months (Cockrell et al. 1993; Herman and Tatar 2001; (Figure 7). The number of generations of monarchs produced in a given year, can vary between three and five and is dependent upon environmental conditions (Brower 1996). Monarchs cannot develop in temperatures lower than 12°C (53°F) or higher than 33°C (91°F) (Zalucki 1982). Each sequential generation produced disperses the species further north into their range. It's crucial along their journey that there are enough milkweed for egg laying as well as nectar producing plants to fuel the adults' energy expenditures for migration and foraging. These nectar producing plants need to be diverse in the time periods that they bloom to provide a food resource throughout the growing season (spring, summer, and fall). The last generation of the year will migrate the full distance south back to where they overwinter. Monarchs at all life stages are impacted by diseases and natural enemies (see Monarch Species Status Assessment [SSA] for more information, USFWS 2020c and 2024a). The protozoan parasite *Ophryocystis elektroscirrha* (OE) is especially well-studied and infection rates among migratory and non-migratory monarchs in different areas are further discussed in the monarch SSA (USFWS 2020c and 2024a).

6.1.3 Numbers, Reproduction, and Distribution

Numbers

Migratory monarchs in North America are the ancestral population for all other monarch populations, and more than 90 percent of monarchs worldwide occur in the North American migratory populations. There are three monarch butterfly populations in North America. Two of

these populations migrate, eastern (east of the Rocky Mountains) and western (west of the Rocky Mountains) (Figure 8). The eastern population overwinters in central Mexico and breeds throughout the U.S. and southern Canada. The western population overwinters along the California coast and breeds across the western states and southern Canada. A non-migratory population of monarch butterflies live in Florida year-round.

Annual winter population estimates of the eastern North American monarch population have been conducted in Mexico since the winter of 1993-1994 (Vidal and Rendón-Salinas 2014) (Figure 9). These estimates are determined by identifying and measuring the area occupied by wintering colonies of monarchs in and near the Monarch Butterfly Biosphere Reserve in Mexico and assuming a density of 21.1 million monarch/hectare (Vidal and Rendón-Salinas 2014; Thogmartin et al. 2017a). The monarchs are so densely clustered that we measure the area of forest occupied by monarch covered trees as a surrogate for overall population numbers. Because the area occupied by overwintering monarchs is a surrogate for overall population numbers, there have been several attempts to come up with the number of monarchs present in one hectare of occupied land to translate into overall number of monarchs present at the overwintering sites each year. The Thogmartin *et al*. (2017a) paper examined the range of estimates from all of these studies and found a median density of 21.1 million monarchs per hectare. Although varying year-to-year, estimates consistently numbered in the hundreds of millions throughout the 1990s and early 2000s and survey data suggest that monarch numbers were as high or higher in the two decades before standardized monitoring began at the Mexican overwintering sites (Calvert and Brower 1986; Vidal and Rendón-Salinas 2014). The latest survey in 2024-2025 indicated there were 1.79 hectares occupied. Based on the estimate of 21.1 million monarchs per hectare, that would result in an estimate of approximately 37.8 million monarchs present in the reserve.

The western North American population has been censused annually since 1997, providing an estimate of annual population size (Figure 10). Recent work, using past survey data, gives estimates of millions of butterflies in the mid-1980s (Schultz et al. 2017). These estimates were for overwintering abundance in coastal California from 1981–2015. The researchers used state-space models to estimate the western monarch population growth rate from spatially and temporally erratic sampling data going back to the early 1980s and found annual abundance estimates were high in the 1980s, fluctuating in the 1990s, and low in the 2000s. Based on the past annual censuses, the western North American migratory population has been generally declining over the last 28 years, despite an increasing number of sites being counted (Figure 10). During the latest survey, the mid-season count estimated 9,119 monarch butterflies across 257 sites (Xerces 2025).

Reproduction

Based on the past annual censuses, the eastern North American migratory monarch population has been generally declining over the last 29 years. Although the numbers at the overwintering

sites have declined, we did not find a corresponding change in the spatial extent of the population during the breeding season. Given its current population size and population growth rate, the estimated probability of extinction (pE) over the next 60 years is 61% (48%–69%; confidence interval [CI] 50%).

Based on the past annual censuses, the western North American migratory population has been generally declining over the last 26 years, despite an increasing number of sites being counted. Modeling conducted for the SSA indicated that under current conditions the risk of extinction over time is predicted to increase sharply, with the estimated pE over 60 years reaching 99% (98%–99%, CI 50%).

Distribution

In eastern North America, monarchs travel north in the spring, from Mexico to Canada, over two to three successive generations, breeding along the way (Flockhart et al. 2013) (Figure 8). Individual monarchs disperse as far north as they can physiologically tolerate based on climatic conditions and available vegetation; the most specific predictors of the distribution of individual monarchs are monthly mean temperature, precipitation, and land use (Flockhart et al. 2013; Flockhart et al. 2017; Kesler and Bunch 2020). While a majority of the eastern monarchs shift to the more northern reaches of their range, western monarchs continue to occupy and breed in warmer climates throughout the summer, while also expanding to include the farther reaches of their range. In the spring in western North America, monarchs migrate north and east over multiple generations from coastal California toward the Rockies and to the Pacific Northwest (Urquhart and Urquhart 1977; Nagano et al. 1993) (Figure 8). In the southwestern states, migrating monarchs tend to occur more frequently near water sources such as rivers, creeks, roadside ditches, and irrigated gardens (Morris et al. 2015).

In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites. This migration can take monarchs distances of over 3,000 km (Urquhart and Urquhart 1978) and last for over two months (Brower 1996). Migratory individuals in eastern North America predominantly fly south or southwest to mountainous overwintering grounds in central Mexico, and migratory individuals in western North America generally fly shorter distances south and west to overwintering groves along the California coast and northern Baja California (Solensky 2004) (Figure 8). Data from monarchs tagged in the southwestern states in the fall suggest that those in Nevada migrate to California, those in New Mexico migrate to Mexico, and those in Arizona migrate to either Mexico or California (Southwest Monarch Study Inc. 2018). In early spring (February–March), surviving monarchs break diapause and mate at the overwintering sites before dispersing (Leong et al. 1995; van Hook 1996). The same individuals that undertook the initial southward migration begin flying back through the breeding grounds and their offspring start the cycle of generational migration over again (Malcolm et al. 1993).

6.1.4 Threats and Conservation Needs

The primary drivers affecting the health of the two North American migratory populations are changes in breeding, migratory, and overwintering habitat (due to conversion of grasslands to agriculture, urban development, widespread use of herbicides, logging/thinning at overwintering sites, unsuitable management of overwintering groves, and drought), continued exposure to insecticides, and effects of climate change. The Monarch SSA provides detailed information on each of the primary drivers affecting the monarch butterfly (USFWS 2020c and 2024a).

Limited Availability, Distribution, and Quality of Milkweed

The availability of milkweed is essential to monarch reproduction and survival. Reduction in milkweed is cited as a key driver in monarch declines (Brower et al. 2012; Pleasants and Oberhauser 2013; Inamine et al. 2016; Thogmartin et al. 2017b; Waterbury and Potter 2018; Saunders et al. 2019; Solis-Sosa 2021).

Much of the milkweed loss has occurred in agricultural lands, where intensive herbicide usage for weed control has resulted in widespread milkweed eradication. Pleasants (2017), for example, estimated that over 860 million milkweed stems were lost in the Midwest between 1999 and 2014, a decline of almost 40%. Currently, approximately 89% and 94% of corn and soybean crop acreage, respectively, are planted as glyphosate (herbicide)-tolerant crops (USDA 2018). Glyphosate use in western agricultural lands has also increased dramatically since the 1990s, especially within the Central Valley of California, Snake River Plain of Idaho, and the Columbia River Basin, which spans the border between Washington and Oregon (USGS 2017; Waterbury and Potter 2018). As weed species develop increasing resistance to glyphosate, other herbicide (e.g., dicamba) tolerant crops are developed, which can lead to a corresponding increase in herbicide use. Accordingly, herbicide impacts to milkweed and nectar plants are expected to continue to impact monarch resources.

Milkweed is also lost on the landscape through development and conversion of grasslands (Lark et al. 2015). Between 2008 and 2016, a total of 4.9 million acres of grassland were converted to new cropland, including up to 3 million acres of Conservation Reserve Program (CRP) land between 2008 and 2012 (Zhang et al. 2021; Lark et al. 2015). Pleasants and Oberhauser (2013) estimate that the loss of agricultural milkweeds in the Midwest has resulted in an 81% decline in monarch production, in part because monarch egg densities were higher on milkweed in agricultural fields (3.89 times more eggs than on non-agricultural milkweed). This particularly impacts the eastern monarch population because more Mexico overwintering monarchs originate from the Midwest crop belt region than any other region (with estimates ranging from 38% to over 85% of all overwintering monarchs originating from the Midwest; Wassenaar and Hobson 1998; Flockhart et al. 2017). Accordingly, herbicide impacts to milkweed and nectar plants will continue to impact monarch resources available in agricultural lands.

Limitations in Breeding and Nectar Resources

Losses of nectar sources during migration have also been particularly implicated as a potential key driver in monarch declines (Inamine et al. 2016; Thogmartin et al. 2017b; Saunders et al. 2019). Losses of nectar resources are due to the same stressors identified above for milkweed resources. Additionally, with a warming climate, drought impacts may become more important, especially in the western population and in the migratory bottleneck for the eastern population.

Availability and Quality of Overwintering Habitat

Both western and eastern monarchs rely on the microclimate provided by the trees at their overwintering sites (Leong et al. 2004; Williams and Brower 2015).

Loss of trees occurs at overwintering sites in Mexico primarily through small- and large-scale logging, storms, and an increasingly unsuitable climate (see Climate Change section below for more details). Most overwintering sites used by eastern monarchs occur within the Monarch Butterfly Biosphere Reserve (Reserve), a 56,259-ha protected area. Within this area, there is a logging ban within the 13,551-ha core zone (Ramírez et al. 2015). However, recent logging has occurred both legally (including salvage logging allowed after storms) and illegally at multiple colonies (Vidal et al. 2014; Brower et al. 2016). Some conversion of forest to avocado plantations has also occurred in the Reserve buffer.

Western monarch overwintering habitat along the Pacific Coast has been subject to loss through various forms of development, particularly urban development (Sakai and Calvert 1991; Frey and Schaffner 2004). Habitat alteration, both natural and anthropogenic, can also alter the microclimate of the western overwintering sites, leading to less suitable habitat conditions (Jepsen et al. 2015). There are many other stressors that can work alone or in tandem on the western overwintering sites, including disease and pests that impact the trees used for overwintering, as well as senescence and improper grove management. Fire is also a threat, both indirectly through habitat loss and directly to overwintering monarchs (Pelton et al. 2016). Drought in the West can further exacerbate the stressors on the western overwintering sites (see Climate Change section below).

Insecticides

Insecticides are pesticides with chemical properties that are designed to kill insects, and most are non-specific and broad-spectrum in nature. That is, insects exposed to these insecticides are susceptible to mortality and/or sub-lethal effects. Furthermore, the larvae of many Lepidopterans are considered major pest species and insecticides are tested specifically on this taxon to ensure that they will effectively kill individuals at application rates indicated on product labels. Even though monarchs are not the target species of these products, they may be exposed to insecticides where they are applied and in areas beyond the insecticide application sites due to drift (Olaya-

Arenas and Kaplan 2019; Halsch et al. 2020). The monarch butterfly is widely distributed across the U.S., occurring in a variety of urban and rural habitat types that include milkweed plants and other flowering forbs. Insecticide impacts to monarchs are primarily influenced by the extent to which monarchs are exposed to insecticides throughout their range. Although insecticide use is most often associated with agricultural production (for example, between 2005 and 2012, 60% of insecticide applied occurred on agricultural lands, USEPA 2017), any habitat where monarchs are found may be subject to insecticide use.

Climate Change

Climate change can affect monarchs both directly and indirectly (Nail and Oberhauser 2015) on both the overwintering, breeding, and migratory grounds. Direct effects of climate change, particularly increasing temperatures, may impact monarch fecundity (Oberhauser 1997), mating success (Solensky and Oberhauser 2009), and survival during migration and while overwintering (Masters et al. 1988; Alonso-Mejía et al. 1997). Laboratory studies indicate optimal temperatures for monarch range from 27–29°C with sublethal effects beginning around 30–36°C range and an upper lethal thermal limit of 42°C (Zalucki 1982; York and Oberhauser 2002; Zalucki and Rochester 2004; Nail et al. 2015). Nighttime temperatures of 34°C during periods with daytime temperatures of 38°C resulted in lower survival, showing that respites from elevated temperatures are important in allowing monarchs to survive temperature stress (Nail et al. 2015). Temperatures consistently above 33°C to 35°C are unsuitable for monarchs and may account for their general absence from southern U.S. states after spring (Malcolm et al. 1987; Zalucki and Rochester 1999).

Monarchs need a very specific microclimate at their overwintering sites not just to avoid storm mortality, but also to avoid early lipid depletion.

Increasing storm frequency in the Mexican overwintering colonies can lead to catastrophic (up to 80%) mortality through the freezing temperatures that accompany these storms (Anderson and Brower 1996; Brower et al. 2004). Severe storms may become more frequent with precipitation predicted to increase during the winter when monarchs are present in Mexico (Oberhauser and Peterson 2003). In addition to the impact climate change may have on overwintering monarchs directly, the Mexico overwintering sites are predicted to be less suitable for oyamel fir trees, the predominant monarch roosting tree, as climate change progresses. Current modeling of the monarch's fundamental niche predicts the loss of 38.6% to 69.8% of current suitable habitat within the Monarch Butterfly Biosphere Reserve by 2050 (Zagorski 2016).

A warming climate may influence breeding habitat by altering suitable locations for both monarchs (Batalden et al. 2007) and their milkweed host plant (Lemoine 2015). Saunders et al. (2019) suggested that nectar resources during migration may be reduced under climate conditions (decreased precipitation) projected for south-central Texas. Drought may also

influence the amount and availability of nectar needed for migrating butterflies (Brower et al. 2015; Stevens and Frey 2010; Espeset et al. 2016). The coastal non-migratory population may also be impacted by loss of habitat through rising sea levels due to climate change (TBCSAP 2015). While drought and increased temperatures may reduce monarch habitat in some areas, the climatically suitable niche for monarchs may increase, potentially increasing their summer breeding grounds if both monarchs and milkweed are able to adapt (Lemoine 2015).
Climate change may additionally impact monarchs in ways that are more difficult to measure. This may include phenological mismatch (e.g., timing of milkweed and nectar sources not aligning with monarch migration; Thogmartin et al. 2017b) or range mismatch with associated species (e.g., changed environmental suitability of monarch natural enemies; McCoshum et al. 2016). Furthermore, recent research suggests that carbon dioxide may impact the medicinal properties of some milkweed species, potentially leading to increased OE parasite virulence and decreased monarch tolerance of OE infections (Decker et al. 2018).

Conservation Needs

Protection, restoration, enhancement and creation of habitat is a central aspect of recent monarch conservation strategies, thus highlighting the importance of restoring and enhancing milkweed and diverse nectar resources (Oberhauser et al. 2017; Pleasants 2017; Thogmartin et al. 2017b; MAFWA 2018; Pelton et al. 2019; WAFWA 2019). Improved management at overwintering sites in California has also been targeted to improve the status of western North American monarch butterflies (Pelton et al. 2019; WAFWA 2019).

6.1.5 Tables and Figures

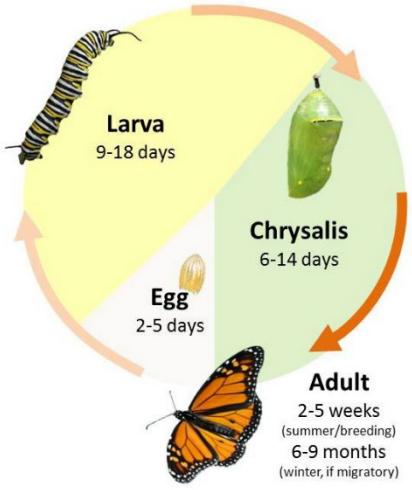

Figure 7. Monarch life cycle. Development times calculated from Zalucki (1982) based on temperature ranging from 22°-32°C (72°-91°F). Adult life span based on Herman and Tatar (2001).

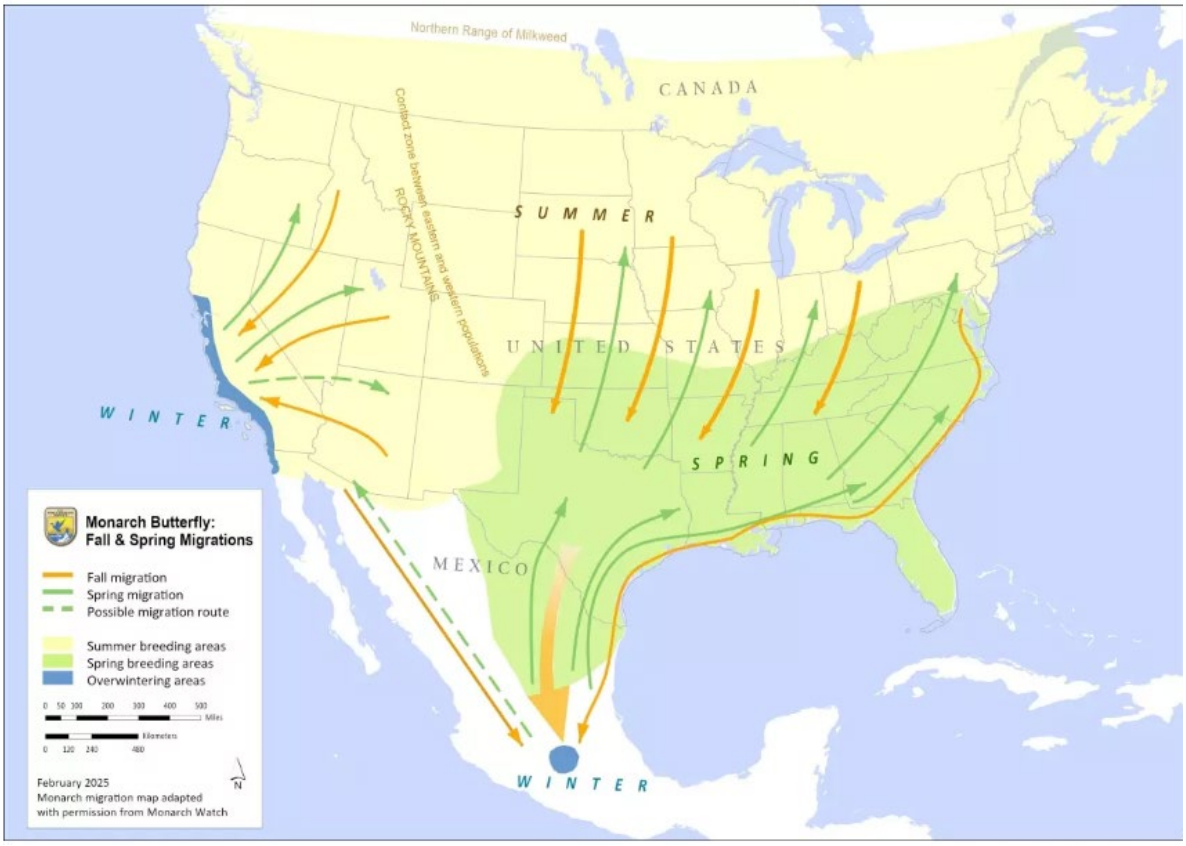

Figure 8. North American monarch migration map (USFWS 2020c and 2024a).

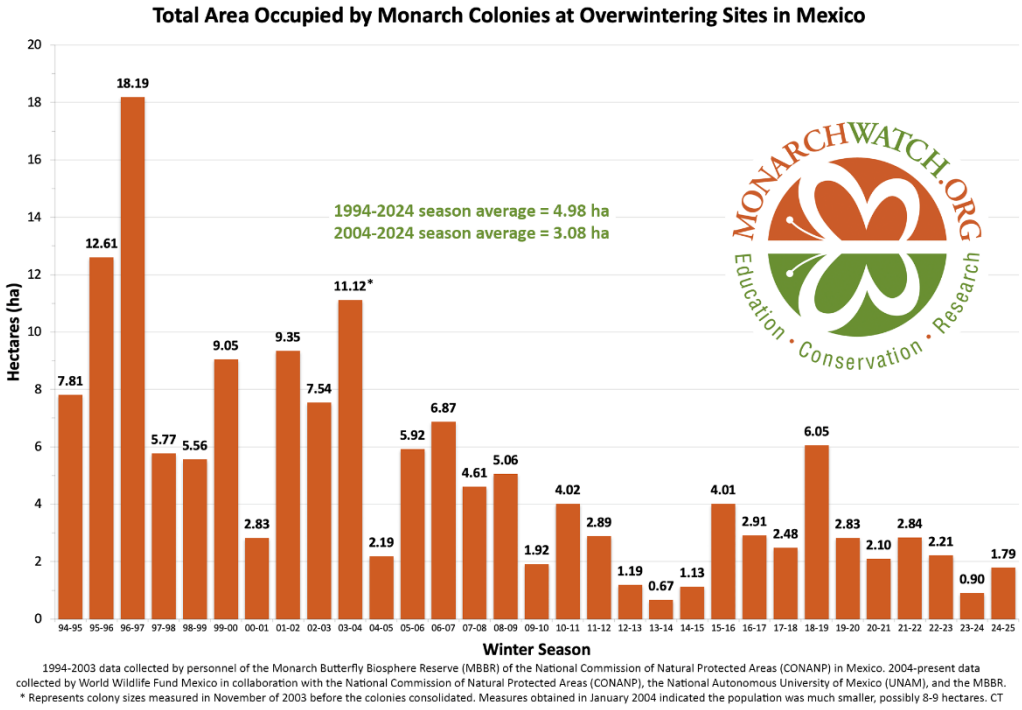

Figure 9. Area occupied (in hectares) by eastern North American monarch butterflies at overwintering sites in Mexico (actual hectare measurement displayed above each bar) (USFWS 2020c and 2024a).

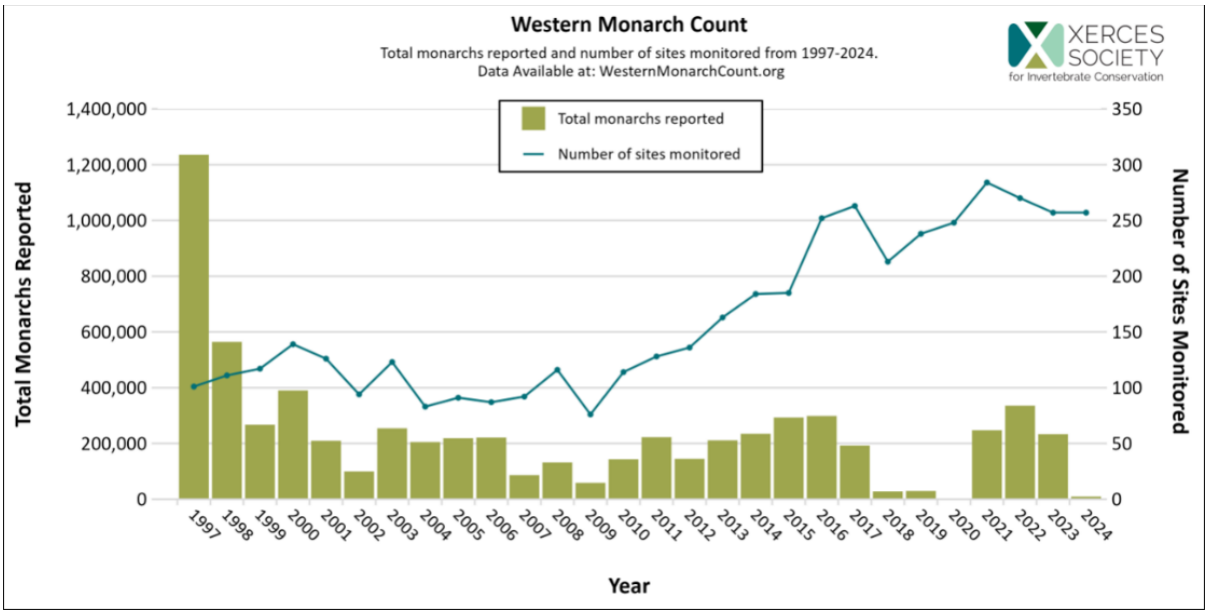

Figure 10. Mid-season counts showing the number of western North American monarch butterflies observed at overwintering sites (green bars). Blue line shows the number of sites monitored (survey effort) for a given year (Xerces 2025).

6.2 Environmental Baseline for Monarch

This section describes the best available data about the condition of the monarch in the Action Area without the consequences caused by the proposed Action.

6.2.1 Action Area Numbers, Reproduction, and Distribution

In general, monarch butterflies from the eastern population occur throughout Nebraska, arriving in May and migrating through the state in September, with breeding occurring throughout the summer. The second, third, and fourth generations reproduce in the northern breeding grounds throughout the summer, inhabiting most of the eastern United States up to southern Canada by June or July. The summer breeding range for monarchs includes most of the central and eastern United States, with the core of the breeding range in the "corn belt" of the midwestern United States (Kansas, Nebraska, Iowa, Missouri, Wisconsin, Illinois, Michigan, Indiana, and Ohio) (USDA 2017). The action area occurs within the Nebraska sandhills which consists of 12 million acres of rolling sand dunes stabilized by native herbaceous vegetation (Scholtz and Twidwell 2022). The Monarch Butterfly U.S. Conservation Units (USFWS 2018b) classify counties as either core or exterior areas for monarch breeding and migration. The action area for the proposed action falls entirely within the *exterior area* conservation unit. The eastern boundary of the action area (Holt County substation) is located next to the county line where the boundary for the core area conservation unit begins.

The monarch, its reproductive host plant, (milkweed) and food resource plant species (nectar resources) are documented within all the counties of the Action Area. The species is highly mobile, moving up to 31 miles in a day, so even if habitat is reduced in the Action footprint, or degraded over time from construction activities, the species is still expected to cross the long Action Area when moving locally and during portion of migration. The Service acknowledges the uncertainty around specific optimal amount of habitat, its spatial distribution, distances between patches as it relates to monarch occupancy and reproductive success (USFWS 2024c). However, given the documentation of the species and necessary habitat, it is reasonable to assume occurrence of the species in suitable habitat, and during local and migratory movements at commencement and throughout all construction activities occurring while monarch are present in the state within the Action footprint. Depending on the time of year, occurrence would include eggs, larvae, pupae and/or adults. The number of individuals is not possible to estimate but would be expected to fluctuate with total habitat in the Action Area, the quality of this habitat and the overall population trend of the species in the eastern population.

Monarch butterflies can use a wide variety of milkweeds as host plants for reproduction. Important milkweed species including common milkweed (*Asclepias syriaca*), swamp milkweed (*A. incarnata*), showy milkweed (*A. speciosa*), and whorled milkweed (*A. verticillata*) are found within the study area for the proposed action and alternatives (Pocius et al. 2018; USDA Plants Database 2025). Diverse nectar resources that bloom throughout the growing season are needed for foraging, but are particularly important during fall migration, during which monarchs make frequent stops to rest and refuel. At these stopovers, they form communal roosts, normally in trees (USDA 2017). Due to the presence of habitat and host plants throughout the study area, the monarch butterfly is highly likely to occur in the study area during migration and the summer breeding season.

Habitat may be used by the monarch butterfly for breeding, feeding or sheltering, but movements by the species are not limited to suitable habitat. Monarch butterflies fly across other land covers that are not habitat when moving between patches of suitable habitat. During spring migration, monarch butterflies can fly up to 31 miles per day, opportunistically stopping at habitat patches as available to refuel and continue their journey (Brower et al. 2006; Grant et al. 2022; Malcolm 2018). Therefore, areas of non-habitat do not limit occurrence, migration or other adult movements throughout the Action Area.

Estimates of population size and reproductive rates within the Action Area are not possible due to a lack of survey or monitoring data and expected fluctuations in ambient conditions of habitat and the factors affecting habitat quality and quantity between years. However, species occurrence and reproduction has been documented in the counties of the action area (Nebraska Lepidoptera 2025).

6.2.2 Action Area Threats and Conservation Needs

The action area is within the summer breeding and migration corridor and therefore all the threats identified for the eastern North American migratory populations in section 6.1.4 pertain to the action area with the exception to those threats at overwintering sites.

Conservation needs of monarchs in the Action Area include increasing the availability of milkweed and diverse nectar resources on the landscape to assist monarch reproduction and migration survival as well as limited use of insecticides.

6.3 Effects of the Action on Monarch

In a BO/CO, the effects of the proposed action are all reasonably certain consequences to the species caused by the action, including the consequences of other activities caused by the action. Activities caused by the action would not occur but for the action. Consequences to species may occur later in time and may occur outside the action area.

We identified and described the activities included in the proposed Action in sections 2.1–2.5. We identified and described other activities caused by the proposed Action in section 2.6. Our analyses of the consequences caused by each of these activities follows.

6.3.1 Effects from Project Design and Construction

Construction of the Action will cause temporary and permanent removal of habitat that may be used by the monarch butterfly for breeding, feeding, and sheltering. The species response after exposure to changed conditions will vary but it is expected that injury and mortality to eggs, larvae and pupae resulting from low to no mobility and the nature of ground and vegetation degradation or destruction activities.

All the activities associated with construction Covered Activities have some level of potential to have effects on the monarch. Activities that use only ATV such as structure staking will have minimal habitat disturbance. Mortality from slow moving equipment is unlikely and not expected to result in a significant amount.

The construction of the project is anticipated to result in temporary disturbance of potential habitat for monarch butterflies, including 156.7 acres of agricultural land cover, 1,036.6 acres of dune vegetation, and 149.6 acres of grassland, shrubland, and prairie. Permanent disturbance of approximately 27 acres could occur in any of these land cover types, but the specific location of this permanent disturbance is unknown. Wetland habitat would be avoided to the maximum extent practicable, which would benefit monarch breeding on milkweed in wetlands. The

removal of habitat containing milkweed during the monarch breeding season could result in direct effects on monarch.

The monarch is highly mobile, moving up to 31 miles in a day, so if habitat is reduced in the Action footprint, or degraded over time from construction activities, the species is still expected to cross the Action Area when moving locally and during portion of migration (Brower et al. 2006; Grant et al. 2022). However, once habitat is destroyed or degraded to the point that it is minimally suitable, the species is expected to stop or greatly limit its selection for ovipositing or feeding. These areas will be lost to production of monarchs until restored. Restoration is estimated to take up to 5 years to fully achieve. Once destroyed or significantly degraded, impacted sites will not contribute to reproductive outputs and local populations could be reduced equivalent to the range of butterflies produced from the lost habitat, until restored. Butterflies may select other areas of habitat outside the Action footprint to meet their life cycle needs, but this could result in increased competition due to the loss of resources from the Action.

Collisions or crushing of individual monarchs with construction equipment, vehicles, and machinery could result in injury or mortality of adults, eggs, larvae and pupae. While there may be effects to individuals, the total area affected by the Actions construction activities is small relative to the potential suitable habitat in the entire Action Area and beyond and is expected to have a correspondingly small effect to the eastern monarch population.

6.3.2 Effects from Operation and Maintenance

Effects resulting from operations and maintenance of the transmission line are expected to be similar to those described for construction, except they should be temporary and limited to the time necessary to complete the action, and if needed the time for restoration activities to mature. Affects to monarch from energization and operation of the line are not expected. Some of the Action's maintenance activities will have the potential to directly affect or indirectly affect the monarch.

Routine maintenance and repairs will begin 30 years after initial construction is completed, and then every 10 years for the remainder of the life of the transmission line and will consist of light weight vehicle or aircraft use that will have minimal effects to habitat.

While there may be effects on individuals, the total area affected by the Action's maintenance and repair activities is small relative to the potential suitable habitat in the entire Action Area and beyond and is expected to have a correspondingly small effect to the eastern monarch population. An estimated 351 acres of temporary habitat disturbance could occur during emergency repairs where storm damage to the line or similar situations must be addressed in a timely manner to restore power and safety to the area. In these situations, larger equipment would be needed to make the repairs, enhancing the amount of habitat disturbance, and potential

for collisions of which could result in injury or mortality. However, these disturbances will be temporary, and restoration will occur if and when necessary.

Application of herbicides as part of the vegetation management activities could have effects to the species if using a non-selective herbicide or broadcast application method that would result in loss of milkweed or other nectar producing plants.

6.3.3 Effects from Conservation Measures

Specific conservation measures for the Monarch are not included in the plan for the Action. However, some of the conservation measures described in section 2.3.3 may provide beneficial effects to monarchs.

Use of existing roads and two-tracks for access to minimize ground disturbance reduces the chances of a collision with individual monarch potentially causing injury or mortality as well as reduces the amount of habitat disturbance.

Overland access with low-ground pressure equipment will be used when two-track is not available. By not blading or filling a road, ground disturbance is reduced and therefore vegetation can recover resulting in faster restoration of the habitat.

Temporary work areas are planned to be sited in areas unsuitable for ABB. These areas could potentially be less suitable for the monarch as well. However, some areas that are considered unsuitable for ABB based on soil type may be used by monarchs.

Helical pier foundations in the sandhills require fewer pieces of equipment and will disturb fewer acres for temporary work areas.

The *use of helicopters for construction* will reduce the amount of habitat disturbance as well as avoid collisions with monarch in the egg, larvae, and pupae life stages. Helicopters could pose a risk for collisions with adults in flight, however there is little to no information documenting this occurring.

Timing of construction activities such as work areas, structure erection, and stringing, pulling, and tensioning are planned to occur from December 1 – February 28th during which time monarch will not be present in the state and therefore eliminating potential collisions.

Restoration of ABB habitat will occur where temporary disturbance has occurred. Restoration of ABB habitat will also benefit monarch habitat.

Mitigation of 594 acres ABB habitat could provide additional benefits to the monarch butterfly despite it not being the proposed purpose of the mitigation.

6.3.4 Effects from Changed Circumstances Responses

Section 2.4 above and Section 7.2 of the R-Project HCP identifies several changed circumstances and includes required responses to these changed circumstances:

1) delisting a covered species (section 2.4.1),
2) a new listed species in the permit area (section 2.4.2),
3) natural/anthropogenic disasters (section 2.4.3),
4) climate change (section 2.4.4),
5) data indicating different levels of take (section 2.4.5)
6) data indicating different ABB range within the project area (section 2.4.6)
7) higher than anticipated levels of emergency repairs required (section 2.4.7).

The Service has reviewed these responses to changed circumstances and potential effects to the monarch. Responses to changed circumstances 1, 2, 5, 6, and 7 would include a permit amendment. Any time the Service signs new section 10 permit instrument for an amendment, we must satisfy the review requirements of section 10 permit issuance, including additional public notice, section 7 review, or NEPA analysis. Therefore, any effects to the ABB from these amendments would be analyzed in that Section 7 compliance and is not considered within this opinion. Responses to changed circumstance 3 and 4 (natural/anthropogenic disasters and climate change) include continued vegetation restoration efforts per the habitat restoration adaptive management. Effects from these changed circumstance responses would be similar to those described for the vegetation restoration actions following construction. Restoration of vegetation following drought, wildfire, and severe storms would result in beneficial effects to the monarch by increasing available habitat in the permit area and ABB mitigation lands following these events. Overall, implementation of responses to the HCP changed circumstances are anticipated to have temporary, short term adverse effects on the monarch that result in the long-term beneficial restoration of habitat.

6.3.5 Effects from other activities caused by the action (renewable energy)

As described in section 2.6.1, Related Renewable Energy, effects to the monarch from related renewable energy projects are not reasonably certain, due to the lack of specific information on wind turbine and solar infrastructure locations.

6.3.6 Summary of Effects of the Action on Monarch

The primary effect the Action will have on the monarch, is habitat degradation through disturbance caused by activities related to construction and maintenance of the transmission line that will reduce the monarchs reproductive plant host as well as high quality nectar producing

plants. Construction/maintenance equipment may collide with individual monarch adults, eggs, larvae, and pupae. Incorporation of conservation measures for ABB will reduce effects to the monarch and the amount of habitat disturbance. The monarch will benefit from the planned acres of restoration and mitigation for ABB habitat.

Due to the action area occurring within the Nebraska Sandhills, which contains 12.5 million acres of intact native grasslands, habitat for the monarch will not be limited by the Action in a measurable amount. The 2,107.6 acres of temporary habitat impacts from construction, operation, maintenance and repairs make up 0.0002% of the available sandhills habitat. Permanent impacts have been limited to 27.3 acres making up 0.000002% of the total acres in the sandhills. Restoration of temporary habitat disturbance is planned as well as mitigation for ABB habitat for both temporary and permanent acres affected resulting in a total of 594 acres that will be protected and managed as ABB habitat but also providing habitat benefiting the monarch.

6.4 Cumulative Effects on Monarch

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this Opinion (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. While we did not identify any specific non-Federal activities occurring in the action area that are reasonably certain to occur (see Section 3), human infrastructure including roads, buildings, power lines and wind energy development unrelated to the R-Project proposed action is likely to continue or increase in locations near the action area. These projects are typically private actions with no existing federal nexus. An increase in human infrastructure near this portion of the migration corridor would likely cause a loss of high-quality habitat for the monarch by ground disturbance, land management changes, and introduction of non-native species to create manicured landscaping further reducing the quality of habitat.

6.5 Conclusion for Monarch

Opinion

The Service defines “jeopardize the continued existence of” as to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

After reviewing the status of the monarch, the environmental baseline for the Action Area, the effects of the Action, as proposed, and the cumulative effects, it is the Service’s conference opinion that the Action is not likely to jeopardize the continued existence of the monarch. The

Action would not be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the monarch in the wild by reducing the reproduction, numbers, or distribution of the entire species. We base our conclusions on the following:

Numbers

- The limited spatial extent of adverse effects from the Action precludes a population level loss of the species range wide numbers.
- Therefore, the Action would not be expected to, directly or indirectly, reduce appreciably the likelihood of survival and recovery of the monarch in the wild by reducing the numbers of the entire species.

Reproduction

- The limited spatial extent of adverse effects precludes a population level loss of the species range wide reproductive output.
- The mobility of the species allows for adult movement to adjacent suitable habitat to allow for completion of the life cycle activities occurring in this portion of the species range, including breeding, feeding, sheltering and necessary local and migratory movements.
- Therefore, the Action would not be expected to, directly or indirectly, reduce appreciably the likelihood of survival and recovery of the monarch in the wild by reducing the reproduction of the entire species.

Distribution

- The effects of the Action on suitable habitat occur on a spatial extent insignificant to the total habitat available to the entire species range wide.
- The mobility of the species allows for adult movement to adjacent suitable habitat to allow for completion of the life cycle activities occurring in this portion of the species range, including breeding, feeding, sheltering and necessary local and migratory movements.
- Temporarily effects to habitat will be restored.
- Some non-habitat land cover will be converted to potential habitat, further minimizing the effects of the Action.
- While monarch conservation actions may be implemented on other lands in the Action Area, the nature of the Action does not prevent or significantly affect their implementation or benefits such that they will not contribute to improvement in the status of the species.
- Therefore, the Action would not be expected to, directly or indirectly, reduce appreciably the likelihood of survival and recovery of the monarch in the wild by reducing the distribution of the entire species.

The Service has made a non-jeopardy determination for the monarch butterfly. Because the species is proposed for listing and we are not estimating or issuing incidental take associated with this action, the monarch will not be discussed further in the ITS.

7. Western Regal Fritillary

This section provides the Service's biological opinion of the Action for the western regal fritillary.

7.1 Status of the Western Regal Fritillary

This section summarizes best available data about the biology and condition of the western regal fritillary (*Argynnis idalia occidentalis*) throughout its range that are relevant to formulating an opinion about the Action. The Service published its decision to propose the western regal fritillary as federally threatened under the ESA on August 6, 2024 (89 FR 63888, USFWS 2024c). The threatened status proposal also includes protective regulations under Section 4(d) of the ESA.

7.1.1 Species Description

The western regal fritillary is a subspecies of the regal fritillary (*Speyeria idalia*) which is a large butterfly found in the native grasslands of the central and northern Great Plains, portions of the Midwest and a single location in eastern Pennsylvania. The species has one annual generation. The regal fritillary is a large, non-migratory butterfly with dorsal orange forewings and dark hindwings that feature black bars, fine white markings, and two rows of large spots at the base. The contrast of predominantly orange forewings and dark hindwings is a useful aid in field identification as it is easily observable during flight, distinguishing the regal fritillary from other large butterfly species. Adults are similar in size to the monarch butterfly (*Danaus plexippus*), with wingspans ranging from approximately 6.8 to 10.5 centimeters (cm) (2.67 to 4.13 inches (in)) (Selby 2007). Females are slightly larger than males (Royer and Marrone 1992) and the sexes are distinguished by the two rows of large spots on the hindwings. Adult females are often more reddish orange than males.

7.1.2 Life History

The regal fritillary exhibits four life stages, which are typical of all butterfly species:

1. Eggs;
2. Larvae;
3. Pupae; and
4. Adults.

The regal fritillary's life cycle across these four life stages is illustrated in Figure 11. The life cycle diagram also highlights important resource needs for the life stages. The larvae, the longest of the life stages, feed exclusively on the leaves of violets (*Viola spp.*). Adults feed on a variety of nectar sources. We summarize life history characteristics for each of these life stages below.

Egg-laying occurs in late summer and fall when individual females may lay hundreds to thousands of eggs in native grassland habitats. Most of the critical nutrition (sugars, amino acids and small proteins) needed for successful egg production is acquired from flower nectar at this time (USFWS 2023b). Eggs are oviposited (laid) singly by adult females in grassland landscapes, usually in shaded microsites, on the underside of senesced vegetation, on rocks or on the ground. Females do not typically lay their eggs on live vegetation, and some authors have observed this does not necessarily occur on, or near, violets (Viola spp.), the larval host plant (Kopper et al. 2000). However, recent observations note the dead remains of dried violet stems and leaves provide olfactory stimuli to females that induces oviposition in the general vicinity where violet plants will grow during the following spring (P. Hammond, personal communication, 2021 in USFWS 2023b). As eggs hatch into larvae, the larvae eat the eggshell before overwintering in nearby vegetation. The species overwinters as first instar larvae in grassland vegetation, emerging in spring to search for violets, their only larval food. Larvae may move considerable distances in search of food depending on the density and spacing of individual violet plants within a habitat area (USFWS 2023b). After five molts (six instars), the larvae pupate within the grasslands and emerge as adult butterflies beginning in late May through mid-July depending on their regional location. Adults feed on a variety of nectar sources. Adult males emerge approximately 1 to 2 weeks prior to females and are shorter-lived than females, surviving approximately 4 to 6 weeks, compared to the 8 to 12 weeks of females. Females exhibit reproductive diapause; while mating occurs early in adult life, egg-development in females is delayed for 6 to 8 weeks, through mid-to-late summer, generally without males present (Kopper et al. 2001).

The regal fritillary is a landscape-level species, dependent on a shifting mosaic of habitat resulting from periodic grassland disturbances, such as fire, grazing, and haying. These periodic disturbances sustain the species' habitat, but they can also cause individual- or population-level harm to regal fritillaries, particularly during the sedentary, early life stages. Adult females can move significant distances during their several-month long lifespan to access habitat on the landscape. The regal fritillary is also a "boom-and-bust" species, which means that when environmental conditions and habitat characteristics are favorable, significant increases in annual population abundance and distribution may occur. When conditions are unfavorable, individuals become scarce, and local extirpations may occur in areas that could be recolonized when conditions improve. The loss and fragmentation of habitat may isolate local populations and contribute to local extirpations. This boom-and-bust nature may allow the subspecies to withstand environmental and demographic stochasticity, catastrophes, and environmental

change. However, the specific habitat or demographic thresholds at which local extirpations may occur are difficult to define.

7.1.3 Numbers, Reproduction, and Distribution

Regal fritillary habitats in the Central Great Plains are described as non-degraded mixed-grass prairie, wet meadows, sub-irrigated meadows associated with stream drainages, non-degraded prairie near marshes, (possibly) moist areas associated with irrigation projects, foothills zone mixed-grass prairie, northern sandhill prairies and tallgrass prairie with well-drained soils and facultative upland plants (Selby 2007; Caven et al. 2017).

The lack of standardized surveys across the range, the area of occupancy and number of functional regal fritillary colonies, populations, and metapopulations within the estimated historical range cannot be determined with certainty. The regal fritillary was estimated to be "endangered, threatened, or extirpated" in approximately 40 percent of its range in the 1980s (Schweitzer 1989). Estimates regarding the species' decline today are as high as 99.9 percent from historical levels based on habitat loss and range contraction (NatureServe 2021). The shorter-term trend is suggested to be at a 30 to 70 percent rate of decline (NatureServe 2021). NatureServe (2021) indicates the "most ominous trend for regal fritillary now may be the breakdown of metapopulation dynamics over most of the range," citing a combination of increased local extinction rate and/or decreased colonization rate that led to the nearly complete elimination of the species in the east. Except for Kansas and Missouri's small pasture metapopulations, Powell *et al*. (2007) asserts that strong metapopulations elsewhere in the species range are probably limited.

The shortgrass prairies on the western edge of the Central Great Plains are among the driest habitats occupied by the species, representing marginal sites that may not support large or persistent regal fritillary populations. In such areas, groundwater-fed streams or springs may provide adequate moisture for violets and nectar sources to support some regal fritillaries, but much of the shortgrass is not suitable, as it lacks required resources. Western occurrences today are thought to be occupied opportunistically by dispersing individuals observed late in the flight season (Fritz 1997 *in* Selby 2007; Crawford and Tronstad 2020). Drought in the Central Great Plains can locally and temporarily result in reduced violet and nectar sources, and in turn, regal fritillary populations.

Regal fritillary populations cannot exist without violets, but while violets have been correlated with regal fritillary presence or abundance (e.g., Kelly and Debinski 1998; Caven et al. 2017; Henderson et al. 2018), the presence or high density of violets does not always equate to presence or greater abundance of regal fritillary populations (Swartz et al. 2015). Other factors, such as recent fires, isolation, local climatic variation, or need for other resources (e.g., nectar sources or bunchgrasses) may play a role (Swengel 1996; Swengel 1997; Debinski and Kelly

1998; Kelly and Debinski 1998; Swengel 2004; Ferster 2005; Ferster and Vulinec 2010; Swartz et al. 2015; McCullough et al. 2019).

However, if regal fritillaries are present in an area, relatively more violets and violet patches within a habitat would serve to increase the likelihood of larval survival, particularly the vulnerable first instar that must search for young violets in the spring (Wagner et al. 1997). The density of violets necessary to establish and maintain regal fritillary populations has been suggested to be 2 to 3 plants per 11 square feet (Henderson et al. 2018).

As with violets, nectar sources are an important resource need as food for adults. Abundant diverse nectar resources (quality and quantity) must be available for adult regal fritillary nutrition from early summer through early fall to ensure survival and eventual reproduction. Absent this resource, an area cannot support regal fritillaries.

An estimated 200 to 400 adults in a population may be needed to maintain genetic diversity. When numbers consistently fall below that level, reductions in fertility and fecundity may occur and populations may be lost (P. Hammond, personal communication, 2021 in USFWS 2023b). Modeling has shown that isolated butterfly populations with an equilibrium population size of less than 50 individuals are unlikely to last 100 years (typically much less), 500 individuals or more are needed to persist 100 years, and many thousands are required for populations to persist indefinitely, not considering stochastic events or changes in habitat (Hanski and Thomas 1994). Few local populations of any butterfly species meet the highest thresholds and are subject to natural extirpation (Hanski and Thomas 1994). Unless they are on very large sites with diverse habitat and high occupancy, isolated regal fritillary populations are at risk of local extirpation.

The regal fritillary is a “boom-and-bust” species, which means that when environmental conditions, habitat characteristics and total available habitat are favorable, significant increases in annual population abundance and distribution may occur. When conditions are unfavorable, individuals become scarce, and local extirpations may occur in areas that could be recolonized when conditions improve. The loss and fragmentation of habitat may isolate local populations and contribute to local extirpations. This boom-and-bust nature may allow the subspecies to withstand environmental and demographic stochasticity, catastrophes, and environmental change. However, the specific habitat or demographic thresholds at which local extirpations may occur are difficult to define.

7.1.4 Threats and Conservation Needs

The Service identified significant threats including grassland fragmentation, conversion to agricultural, urban development, invasive woody vegetation, drought, local climate events, and in some contexts, periodic disturbances from fire, haying and grazing (USFWS 2023b). The life cycle needs of regal fritillaries require sufficient size and quality of habitat to breed, feed, shelter

and move between these resources. Violets are required to support larval growth, nectar sources sustain breeding females into the fall, and native grasslands with tall vegetation that provide shelter for all life stages. Optimal habitat is large native grassland patches of approximately a minimum of 2,500 acres with species specific connectivity to other similar, large patches to ensure adequate population demographics such as survival rates, growth trends and recruitment rates (USFWS 2023b). Minimum patch size is not well understood, but open grassland areas of at least 100 acres with prairie remnants or lightly grazed pastures containing a high density of host plants are most likely to support a viable occurrence of the species (McCullough 2019) if sufficiently connected to other habitat patches.

There are multiple pollinator-focused conservation efforts by a wide range of stakeholders that seek to address threats to these species through implementation of targeted conservation actions and measures. Despite these efforts, the population status of the species seems to be declining as indicated by reduced occupancy of otherwise suitable habitat. It is expected that many, if not all, of these threats will continue to varying degrees.

7.1.5 Tables and Figures

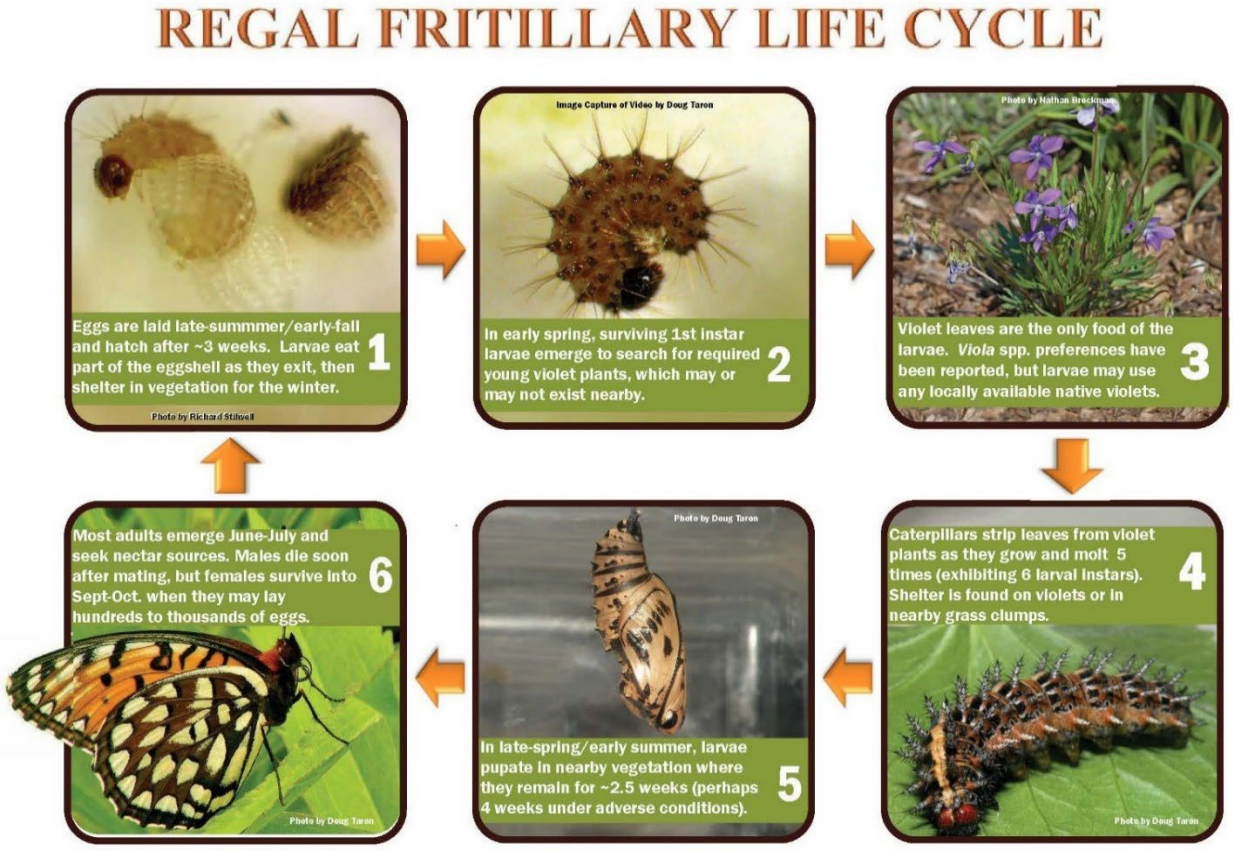

Figure 11. Regal fritillary life cycle and general ecology. Diagram originally developed by Reiman Gardens, Ames, Iowa; modifications made by the Service with permission (USFWS 2023b).

7.2 Environmental Baseline for Western Regal Fritillary

This section describes the best available data about the condition of the western regal fritillary in the Action Area without the consequences caused by the proposed Action.

7.2.1 Action Area Numbers, Reproduction, and Distribution

The Central Great Plains is one stronghold for the subspecies, with Kansas, Nebraska, North Dakota, and South Dakota having relatively larger, more numerous, and overall, less fragmented habitat patches than Midwestern states (Selby 2007). NatureServe (2021) characterizes metapopulations as only occupying a "few hundred" relatively widely distributed sites in Kansas, Missouri and Nebraska. In Nebraska, regal fritillary are associated with wet meadows in the sandhills and sub irrigated meadows near stream drainages (Selby 2007). The Action area intersects the sandhills, and much of it contains landscape grasslands with potential to host violets making them suitable for the western regal fritillary. The amount of habitat would be similar to that of what was discussed for the monarch butterfly with the variances such as the host plant for regal fritillary being violets. Western regal fritillary have the potential to occur in the acres dominated by herbaceous vegetation in the Action Area with documentation of occurrence within all of the counties of the Action area (Nebraska Lepidoptera 2025). Several species of violet that are needed for western regal fritillary reproduction have potential to occur in the Action area such as Bird's foot violet (*Viola pedata*), common blue violet (*Viola papilionacea),* lance-leaf violet (*Viola lanceolata*), Nuttall's violet (*Viola nuttallii*), arrowleaf violet (*Viola sagittata*), Johnny Jumpup (*Viola tricolor*), and prairie violet (*Viola pedatifida*). Data for the occurrence of these violets in the Action area are limited but based on the USDA Plants Database (2025), most of the species are native to Nebraska and occur in at least one of the counties within the Action area or adjacent to one. Counties near the Action area with documented occurrence data of at least one of the above species of violet are Cherry, Brown, Rock, Holt, Logan, Custer, and Dawson. Because the occurrence data for violets is limited, having an occurrence recorded in an adjacent county increases the potential that it does occur in the Action area despite there not being a county record of it.

Western regal fritillary butterflies use specific habitat for breeding, feeding and sheltering, but fly across other land covers that are not habitat when moving between patches of suitable habitat. Regal fritillaries are not migratory, but are capable of strong and rapid flight, and individuals may move long distances from breeding colonies (Selby 2007). The species is considered "very dispersive" where individuals move widely in their search for foraging sites (Schweitzer 1989). This mobility is part of what allows for continued persistence of variously dispersed metapopulations. Therefore, areas of non-habitat do not limit occurrence, migration or other adult movements throughout the Action Area. Most of the counties in the Action Area are

expected to have potential for occurrence due to habitat, or adult movements regardless of suitability of land use/land cover transited.

The population size of western regal fritillary within the action area is expected to be similar to populations within other areas of similar habitat throughout the majority of the Central Great Plains. Estimates of population size and reproductive rates within the Action Area are not possible due to a lack of survey or monitoring data and expected fluctuations in ambient conditions of habitat and the factors affecting habitat quality and quantity between years.

7.2.2 Action Area Conservation Needs and Threats

All the threats identified as affecting western regal fritillary range-wide occur throughout all or portions of the Action Area, and Actions footprint. The study area is 48% agricultural, 24% grassland, and 17% dune vegetation landcover types with row crops making up half of the agricultural cover type. Fragmentation and land use that leads to diminished habitat quality are the main threats within the Action area.

The conservation needs of western regal fritillary in the Action Area are similar to the needs of monarch butterflies and other pollinators and include incentives for large scale restoration of converted grassland patches, or smaller patches within the proposed Action Area to support increased reproduction and population sustainment. Of the remaining habitat patches, western regal fritillary individuals and populations would benefit from increased compatible land use and management actions to maximize habitat quality through increased populations of violets and diverse native flowering plants. A greater number and size of habitat patches occurring throughout the lengthy Action Area, would span a range of ecoregions, precipitation and growing season gradients that allow for potential to minimize effects like drought on small, isolated patches of habitat.

7.3 Effects of the Action on Western Regal Fritillary

In a BO/CO, the effects of the proposed action are all reasonably certain consequences to the species caused by the action, including the consequences of other activities caused by the action. Activities caused by the action would not occur but for the action. Consequences to species may occur later in time and may occur outside the action area.

We identified and described the activities included in the proposed Action in sections 2.1–2.5. We identified and described other activities caused by the proposed Action in section 2.6. Our analyses of the consequences caused by each of these activities follows.

7.3.1 Effects from Project Design and Construction

Construction of the Action would remove and further fragment habitat that may be used by the western regal fritillary for breeding, feeding, and sheltering. The proposed action does have potential for habitat improvement where planned removal of 42.1 acres of ROW wooded land cover that will be removed, restored, and managed as an herbaceous or short shrub cover. All of the proposed action's construction activities will result in habitat degradation or loss through trampling, conversion, and removal of portions of the existing intact vegetation. The SEIS estimates 1,756.6 acres of temporary disturbance and 27.3 acres of permanent disturbance from construction. It's not clear if those acres of disturbance will be within regal fritillary habitat, but for the purpose of this CO we will assume they are habitat. While temporary due to commitments for restoration at the end of construction, the duration of the temporary effects could extend up to 7 years (i.e., 2 years of construction and up to 5 years for restoration activities to mature). Collisions with or crushing by construction equipment, vehicles, and machinery within the Action Area is possible and could result in injury or mortality of adults, eggs, larvae, and pupae, but is anticipated to be limited due to the expected slower speed of vehicles due to site conditions, and conservation measures in place. Construction is expected to occur year-round until completion with the specific schedule of activities dependent on the start and progress of construction. Portions of the proposed action will have intensive but short duration of activities while others will have more extended activity in a set location.

The western regal fritillary, its reproductive host plant, and food resource plant species are known or expected to occur in all of the counties (7 of 7 for western regal fritillary; various counties for multiple species of violets) of the action area. The species is highly mobile, so even if habitat is reduced in the action area, or degraded over time from construction activities, the species is still expected to move through the action area when moving locally. The Service acknowledges the uncertainty around specific optimal amount of habitat, its spatial distribution, distances between patches as it relates to western regal fritillary occupancy and reproductive success (USFWS 2023b). However, given the documentation of the species and necessary habitat, it is reasonable to assume occurrence of the species in habitat, and during local movements at commencement and throughout all construction activities in the Action footprint. Depending on the time of year, occurrence would include eggs, larvae, pupae and/or adults. The number of individuals is not possible to estimate but would be expected to fluctuate with total habitat in the Action Area, the quality of this habitat and the overall population trend of the species in the population.

The species response after exposure to changed conditions will vary but it is expected that injury and mortality to eggs, larvae, and pupae resulting from low to no mobility and the nature of ground and vegetation degradation or destruction activities. Once habitat is destroyed or degraded to the point that it is minimally suitable, the species is expected to stop or greatly limit its selection for ovipositing or feeding. Assuming little to no improvement in vegetative

conditions these areas will be lost to production of the species until restored, possibly extending more than 4 years or more after initiation of construction. Once destroyed or significantly degraded, impacted sites will not contribute to reproductive outputs and local populations could be reduced equivalent to the range of western regal fritillary produced from the lost habitat, until restored. Adult western regal fritillary may select other areas of habitat outside the Action footprint to meet their life cycle needs, but this could result in increased competition due to the loss of resources from the Action. Collisions could result in injury or mortality. While there may be effects to individuals, the total area affected by the construction activities is small relative to the potential habitat in the entire Action Area and is expected to have a correspondingly small effect to the range-wide population of western regal fritillary.

7.3.2 Effects from Operations and Maintenance

The species is exposed to the effects due to known occurrence of the species in limited portions of the Action Area, as well as occurrence of its reproductive host plant, and flowering plants for foraging in all of the Action Area counties. Effects resulting from operations and maintenance activities are expected to be similar to those described for construction, except they should be temporary and limited to the time necessary to complete the Action, and if needed, the time for restoration activities to result in mature vegetation. All operation and maintenance activities, including inspections, vegetation management, and equipment repairs require ingress and egress of personnel, materials, and equipment that can result in habitat degradation or loss of existing intact habitat. The SEIS estimates 351 acres of habitat within the Action area would be subject to temporary and potentially recurring disturbance during operations and maintenance activities, when they are needed. The potential for recurring temporary disturbance occurs following the initiation of operations and continues through the approximately 50-year life span of the Action. Application of herbicides as part of the vegetation management activities could have effects to the species, but with the implementation of conservation measures that emphasize targeted treatment over broadcast applications, it is unlikely that this will result in effects to the species.

7.3.3 Effects from Conservation Measures

Specific conservation measures for the western regal fritillary are not included in the plan for the Action. However, some of the conservation measures described in section 2.3.3 may provide beneficial effects.

> *Use of existing roads and two-tracks* for access to minimize ground disturbance reduces the chances of a collision with individuals potentially causing injury or mortality as well as reduces the amount of habitat disturbance.

Overland access with low-ground pressure equipment will be used when two-track is not available. By not blading or filling a road, ground disturbance is reduced and therefore vegetation can recover resulting in faster restoration of the habitat.

Temporary work areas are planned to be sited in areas unsuitable for ABB. These areas could potentially be less suitable for western regal fritillary as well. However, some areas that are considered unsuitable for ABB based on soil type may be used by western regal fritillary.

Helical pier foundations in the sandhills require fewer pieces of equipment and will disturb fewer acres for temporary work areas.

The *use of helicopters for construction* will reduce the amount of habitat disturbance as well as avoid collisions with western regal fritillary in the egg, larvae, and pupae life stages. Helicopters could pose a risk for collisions with adults in flight, however there is little to no information documenting this occurrence.

Timing of construction activities such as work areas, structure erection, and stringing, pulling, and tensioning are planned to occur from December 1st – February 28th. Unlike the monarch, western regal fritillary larvae overwinter in Nebraska and would still be at risk for collisions with construction equipment at this time.

Restoration of ABB habitat will occur where temporary disturbance has occurred. Restoration of ABB habitat will also benefit western regal fritillary habitat.

Mitigation of 594 acres ABB habitat could provide additional benefits to the western regal fritillary despite it not being the proposed purpose of the mitigation.

7.3.4 Effects from Changed Circumstances Responses

Section 2.4 above and Section 7.2 of the R-Project HCP identifies several changed circumstances and includes required responses to these changed circumstances:

1) delisting a covered species (section 2.4.1),
2) a new listed species in the permit area (section 2.4.2),
3) natural/anthropogenic disasters (section 2.4.3),
4) climate change (section 2.4.4),
5) data indicating different levels of take (section 2.4.5)
6) data indicating different ABB range within the project area (section 2.4.6)
7) higher than anticipated levels of emergency repairs required (section 2.4.7).

The Service has reviewed these responses to changed circumstances and potential effects to the western regal fritillary. Responses to changed circumstances 1, 2, 5, 6, and 7 would include a permit amendment. Any time the Service signs new section 10 permit instrument for an amendment, we must satisfy the review requirements of section 10 permit issuance, including additional public notice, section 7 review, or NEPA analysis. Therefore, any effects to the ABB from these amendments would be analyzed in that Section 7 compliance and is not considered within this opinion. Responses to changed circumstance 3 and 4 (natural/anthropogenic disasters and climate change) include continued vegetation restoration efforts per the habitat restoration adaptive management. Effects from these changed circumstance responses would be similar to those described for the vegetation restoration actions following construction. Restoration of vegetation following drought, wildfire, and severe storms would result in beneficial effects to the western regal fritillary by increasing available habitat in the permit area and ABB mitigation lands following these events. Overall, implementation of responses to the HCP changed circumstances are anticipated to have temporary, short term adverse effects on the Western regal fritillary that result in the long-term beneficial restoration of habitat.

7.3.5 Effects from other activities caused by the action (renewable energy)

As described in section 2.6.1, Related Renewable Energy, effects to the western regal fritillary from related renewable energy projects are not reasonably certain, due to the lack of specific information on wind turbine and solar infrastructure locations.

7.3.6 Summary of Effects of the Action on Western Regal Fritillary

The effects of the action on western regal fritillary will be similar to those discussed for the monarch. The primary effect is habitat degradation through disturbance caused by activities related to construction and maintenance of the transmission line that will reduce the western regal fritillary's reproductive plant host as well as high quality nectar producing plants. Construction/maintenance equipment may collide with individual adults, eggs, larvae, and pupae. Incorporation of conservation measures for ABB will reduce effects to the western regal fritillary and the amount of habitat disturbance. The species will benefit from the planned acres of restoration and mitigation for ABB habitat.

Due to the action area occurring within the Nebraska Sandhills, which contains 12.5 million acres of intact native grasslands, habitat for the western regal fritillary will not be limited by the Action in a measurable amount. The 2,107.6 acres of temporary habitat impacts from construction, operation, maintenance and repairs make up 0.0002% of the available sandhills habitat. Permanent impacts have been limited to 27.3 acres making up 0.000002% of the total acres in the sandhills. Restoration of temporary habitat disturbance is planned as well as mitigation for ABB habitat for both temporary and permanent acres affected resulting in a total

of 594 acres that will be protected and managed as ABB habitat but also providing habitat benefiting the western regal fritillary.

7.4 Cumulative Effects on Western Regal Fritillary

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this Opinion (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. While we did not identify any specific non-Federal activities occurring in the action area that are reasonably certain to occur (see Section 3), human infrastructure including roads, buildings, power lines and wind energy development unrelated to the R-Project proposed action is likely to continue or increase in locations near the action area. These projects are typically private actions with no existing federal nexus. An increase in human infrastructure near this portion of the migration corridor would likely cause a loss of high-quality habitat for the western regal fritillary by ground disturbance, land management changes, and introduction of non-native species to create manicured landscaping further reducing the quality of habitat.

7.5 Conclusion for Western Regal Fritillary

Opinion

The Service defines "jeopardize the continued existence of" as to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

After reviewing the status of the western regal fritillary, the environmental baseline for the Action Area, the effects of the Action, as proposed, and the cumulative effects, it is the Service's conference opinion that the Action is not likely to jeopardize the continued existence of the western regal fritillary. The Action would not be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the western regal fritillary in the wild by reducing the reproduction, numbers, or distribution of the entire species. We base our conclusions on the following:

Numbers

- The limited spatial extent of adverse effects from the Action precludes a population level loss of the species range wide numbers.
- Therefore, the Action would not be expected to, directly or indirectly, reduce appreciably the likelihood of survival and recovery of the western regal fritillary in the wild by reducing the numbers of the entire species.

Reproduction

- The limited spatial extent of adverse effects precludes a population level loss of the species range wide reproductive output.
- The mobility of the species allows for adult movement to adjacent habitat to allow for completion of the life cycle activities occurring in this portion of the species range, including breeding, feeding, sheltering and necessary local and migratory movements.
- Therefore, the Action would not be expected to, directly or indirectly, reduce appreciably the likelihood of survival and recovery of the western regal fritillary in the wild by reducing the reproduction of the entire species.

Distribution

- The effects of the Action on habitat occur on a spatial extent insignificant to the total habitat available to the entire species range wide.
- The mobility of the species allows for adult movement to adjacent habitat to allow for completion of the life cycle activities occurring in this portion of the species range, including breeding, feeding, sheltering and necessary local movements.
- Temporary effects to habitat will be restored.
- Some non-habitat land cover will be converted to potential habitat, further minimizing the effects of the Action.
- Therefore, the Action would not be expected to, directly or indirectly, reduce appreciably the likelihood of survival and recovery of the western regal fritillary in the wild by reducing the distribution of the entire species.

The Service has made a non-jeopardy determination for the western regal fritillary. Because the species is proposed for listing, and we are not estimating or issuing incidental take associated with this action, the species will not be discussed further in the ITS.

8. Incidental Take Statement

ESA §9(a)(1) and regulations issued under §4(d) prohibit the take of endangered and threatened fish and wildlife species without special exemption. The term "take" in the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (ESA §3(19)). In regulations, the Service further defines:

- "harm" as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering;" (50 CFR §17.3)
- "harass" as "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering;" (50 CFR §17.3); and

- "incidental take" as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant" (50 CFR §402.02).

Under the terms of ESA §7(b)(4) and §7(o)(2), taking that is incidental to a Federal agency action that would not violate ESA §7(a)(2) is not considered prohibited, provided that such taking is in compliance with the terms and conditions of an incidental take statement (ITS).

Under ESA §10(a)(1)(B), the Service may authorize incidental take caused by otherwise lawful non-federal actions through an Incidental Take Permit (ITP), provided that such authorization satisfies all permit issuance criteria. In the preceding BO/CO, we determined that the activities described in the Applicant's HCP are reasonably certain to cause incidental take of the ABB. We collate our estimates of the amount or extent of take in section 8.1, which follows. A proposed ESA §10(a)(1)(B) permit is unique among Federal actions for which the Service prepares a BO in that:

- the Federal agency (the Service) does not fund, authorize, or carry out the non-Federal activities described in the HCP;
- the ITP authorizes the anticipated incidental taking of wildlife caused by these activities; and
- the ITP specifies all necessary and appropriate measures (in addition to those proposed in the HCP), including reporting requirements, that would minimize and mitigate the impacts of the anticipated incidental taking to the maximum extent practicable.

Therefore, we incorporate by reference from any §10(a)(1)(B) permit(s) issued with respect to the proposed HCP all required (non-discretionary):

- conservation measures;
- terms and conditions;
- monitoring and reporting requirements; and
- provisions for the disposition of dead or injured animals.

8.1 Amount or Extent of Take

This section specifies the amount or extent of take of listed wildlife species, the American burying beetle, that the Action is reasonably certain to cause, which we estimated in the "Effects of the Action" section for the American burying beetle (section 4.3 of this BO/CO). As stated in section 5.3 of this BO/CO, the Service does not anticipate take for the whooping crane. Additionally, this CO is not providing an estimate of incidental take for the proposed species, monarch and western regal fritillary, which is not required under the ESA. Therefore, this incidental take statement does not further address whooping crane, monarch, or western regal fritillary.

8.1.1 American Burying Beetle

Incidental take of ABBs will result from the R-Project's Covered Activities. Covered Activities associated with the construction will account for an estimated take of 147 ABB during construction of the R-Project. Covered Activities associated with the emergency repairs of the R-Project will account for an estimated 29 ABB. Other operation and maintenance activities will not result in take. Total incidental ABB take is 176 for construction and emergency repairs of the R-Project over the 50-year ITP duration. The incidental take is expected to be in the form of harm and harassment[3]. Harassment to individual beetles may occur from construction activities and harm to the species may occur through activities that kill individual ABBs as well as alter the suitability of the habitat to support ABBs.

As discussed in Section 4.2.1, incidental take is also being measured in habitat acres impacted. The anticipated disturbance to the ABB habitat includes temporary (1,500 acres) and permanent (20 acres) impacts as a result of the proposed Covered Activities over the 50-year life of the ITP. The Restoration Plan will ensure that the temporary impacts to habitat are restored to provide suitable habitat for the ABB and its prey within 5 years post construction.

Annual ABB population compliance monitoring will be conducted each August at the same 79 trap locations originally established for the August 2016 survey. Results of these annual ABB surveys will be compared to the estimated take number in the HCP and ITP. Annual surveys will determine if ABB take will potentially exceed that estimated in the HCP and ITP.

8.2 Reasonable and Prudent Measures and Terms and Conditions for American Burying Beetle

The HCP permit contains all measures necessary to avoid, minimize, and mitigate incidental take of the American burying beetle to the maximum extent practicable and requires that the HCP be fully implemented. All conservation measures described in the proposed HCP, together with the terms and conditions of any section 10(a)(1)(B) permit or permits issued with respect to the proposed HCP, are incorporated herein by reference as reasonable and prudent measures and terms and conditions within this incidental take statement as stated in 50 CFR 402.14(i). Such terms and conditions are non-discretionary. Monitoring and reporting will be conducted as stated in section 6.3 and 6.6 of the HCP. Therefore, no additional reasonable and prudent measures and terms and conditions are necessary for American burying beetle.

[3] The HCP only contemplates take in the form of harm. The Service has concluded that take in the form of harm and harassment may occur and will be covered by the permit. Both forms of take (harm and harass) affect the same individuals in the same geographic area (covered area); therefore, the avoidance, minimization, and mitigation measures in the HCP remain appropriate for minimizing and mitigating both harm and harassment to the maximum extent practicable.

9. Conservation Recommendations

The Service has no conservation recommendations to include in this consultation because the Permittee included recommended conservation measures, including monitoring and reporting that were incorporated into the HCP.

10. Reinitiation Notice

Formal consultation for the Action considered in this BO is concluded. Reinitiating consultation is required if the Service retains discretionary involvement or control over the Action (or is authorized by law) when:

a. the amount or extent of incidental take is exceeded;
b. new information reveals that the Action may affect listed species or designated critical habitat in a manner or to an extent not considered in this BO;
c. the Action is modified in a manner that causes effects to listed species or designated critical habitat not considered in this BO; or
d. a new species is listed or critical habitat designated that the Action may affect.

In instances where the amount or extent of incidental take is exceeded, the Service is required to immediately request a reinitiation of formal consultation.

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